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DYESTUFF REPORTER

DEVOTED TO TEXTILE WET-PROCESSING

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AMERICAN

DYESTUFF REPORTER

Volume 48 October 5, 1959 No. 20

THE CHEMISTRY OF THE AMINONAPHTHOQUINONES

ERNEST MERIAN
Sandoz, Ltd
Basle, Switzerland

INTRODUCTION

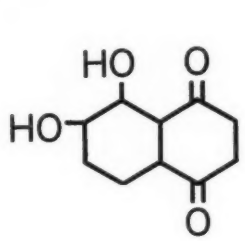
IN 1861, M Z Roussin (*1*) tried to produce alizarin from dinitronaphthalene and discovered naphthazarin, which was later destined to achieve a certain importance as alizarin black. A number of patents(*2*) were issued relating to the production of this compound, but it was not until 1925 that its constitution was established by O Dimroth and F Ruck(*3*) as 5,8-dihydroxy-1,4-naphthoquinone.

A great number of compounds have been produced in the last sixty years with naphthazarin as starting product. One of the oldest substitution products is naphthopurpurin(*4*), the 5,6,8-trihydroxy-1,4-naphthoquinone, which also found use as a mordant dye (Table III).

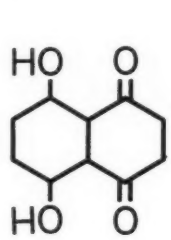
Later, numerous halogenated and methylated naphthazarins were prepared (cf Table I). These red dyes

TABLE I

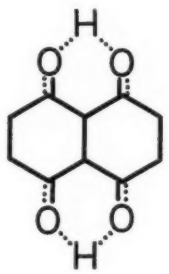
Naphthazarin and its derivatives



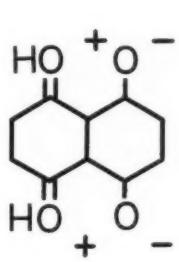
Empirical formula (1870-1925)



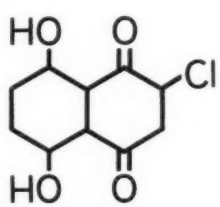
Dimroth 1925



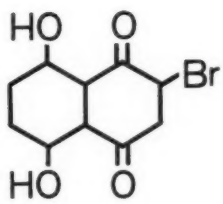
Hydrogen bonds



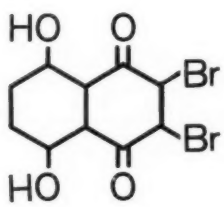
Resonance formula



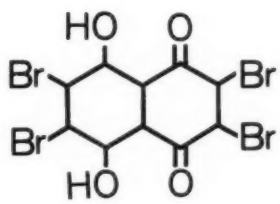
176°F
Zincke 1895



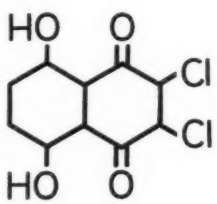
189°F
Wheeler 1917



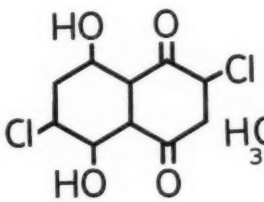
258°F
Wheeler 1917



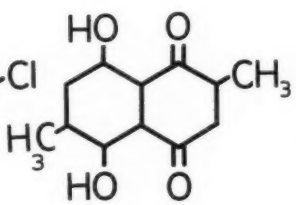
300°F
Wheeler 1927



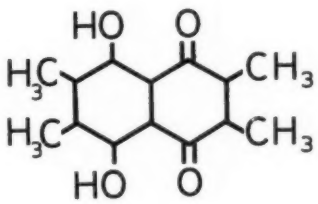
195°F
Waldmann 1950



Dec 240°
Bruce 1955



Dec >200°
Bruce 1955

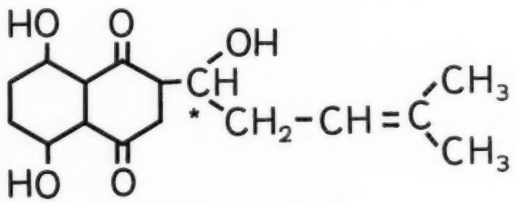


289°F
Waldmann 1950

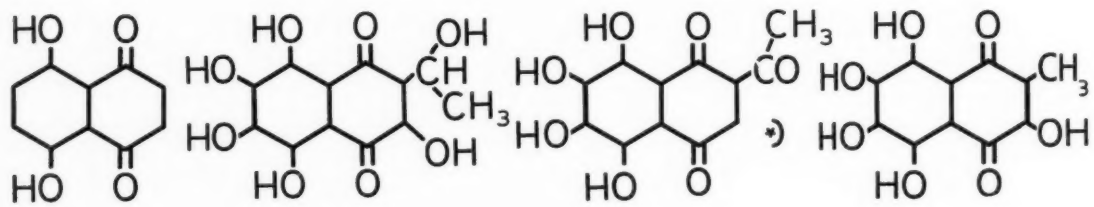
have only slight affinity for acetate, polyamide and polyester fibers from aqueous dispersion. A few naphthazarin derivatives (cf Table II) have been found as natural dyes in plants, fungi, and the sea urchin (echinus). Two of these, alkannin and shikonin, were used in former times for textile dyeing. The first is obtained from the roots of alkanet *(Anchusa tinctoria)* or ox-tongue, which is native to Southern Europe, Hungary and Asia Minor, while shikonin is extracted from the Japanese plant *Lithospermium erythrorhizone* (Tokyo violet). The "Papyrus Graecus Holmiensis" contains instructions for dyeing with alkannin, extracted from the roots of the plant with oil or alcohol. It dyes alum-mordanted wool and silk in violet shades of good fastness to light and washing(5). Pomades, polishes, leather, and cheese also were dyed with alkannin from as early as the fourth century BC. The red 4,9-dioxperylene-3,10-quinone(*6*) represents a higher analogue of naphthazarin and is related to the blood-lymph dye Erythroaphin-fb of the

TABLE II

Some natural derivatives of naphthazarin



ALCANNINE: levo-rotatory
SHICONINE: dextro-rotatory

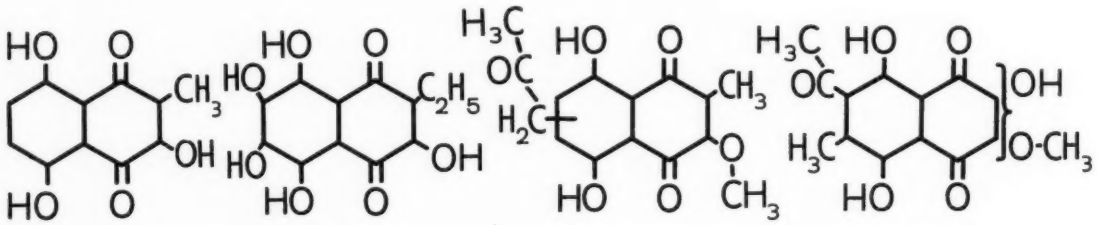


Spinazarine
Kuroda 1940

Spinochrome A
Kuhn 1941

Spinochrome B
Musajo 1942

Spinochrome D (Aka)
Kuroda 1944

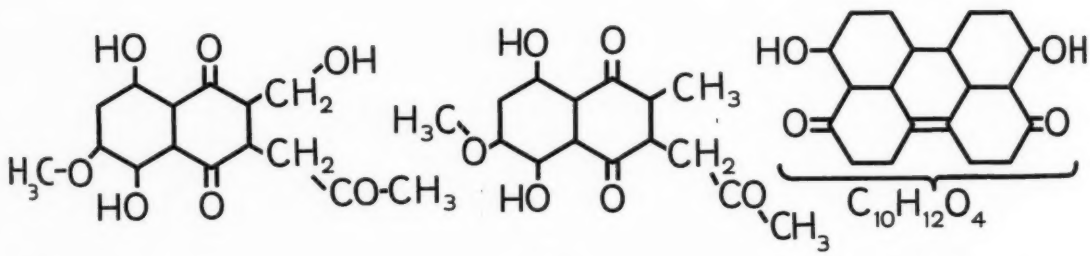


Hydroxydroserone
Winzor 1935

Echinochrome A
Kuhn 1939

Solanione
Weiss 1949

Cordeauxiaquinone
Karrer 1955



Fusarubine
Ruelius 1950/Birch 1954

Javanicine
Arnstein 1947/Birch 1954

Erythroaphine-fb
Todd 1945

*) According to Kuroda 1944, Spinochrome B corresponds to 2,3,6,8-tetrahydroxy-1,4-naphthoquinone

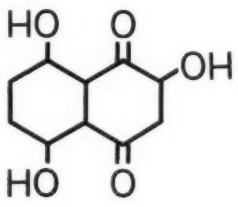
black aphid *(Aphis fabae)*.

Combinations of much greater tinctorial strength were obtained by condensation of naphthazarin and its derivatives with aromatic amines. The dyes were after-chroming blacks and at the time were highly valued despite their poor fastness to potting. Their constitution was not finally determined until much later by W Stockar(7), who discovered that they were essentially monocondensation products (cf Table III).

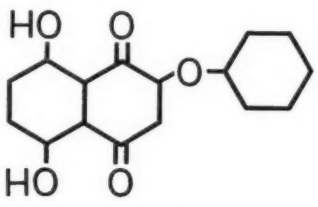
According to C Mettler(8), these monocondensation products dye cellulose acetate in bordeaux shades which lack lightfastness and are of no practical value. In general it can be said that beta-substituted naphthazarins have not achieved any technical importance. The beta-substituted alpha-naphthoquinones too are insufficiently fast to light, as for example the red-brown acetate dye from 2,3-dichloro-1,4-naphthoquinone and 2-aminophenyl-1 [beta-(beta-methoxy)-ethoxy]-ethyl ether, which shows grade 1 lightfastness. A few vat dyes exemplified by CI Vat Red 33 (Table III), form an

TABLE III

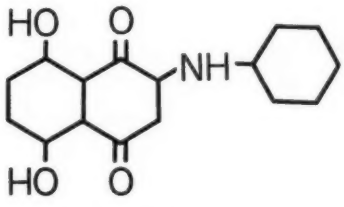
Condensation products of the naphthazarin series



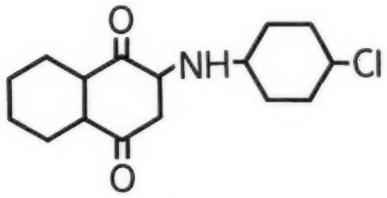
Naphthopurpurin
Bayer 1894
BASF 1905



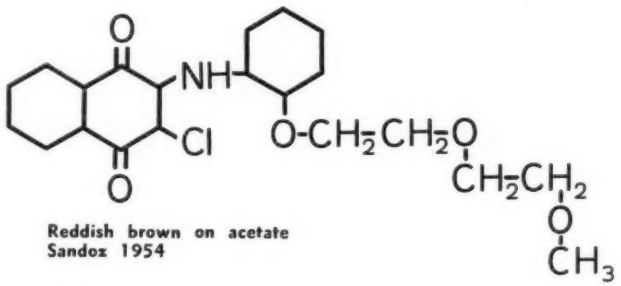
Alizarin Dark Green W
BASF 1897



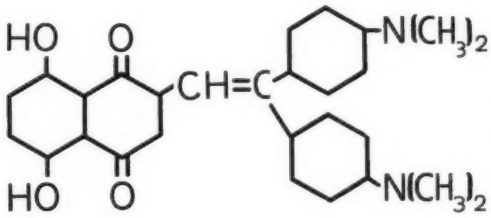
Alizarin Black SRA
BASF 1897/Stockar 1942



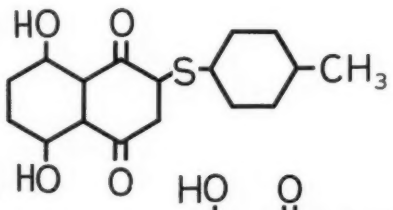
Helindon Red CR
Hoechst 1916



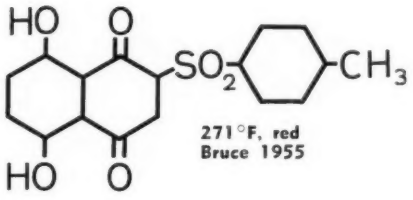
Reddish brown on acetate
Sandoz 1954



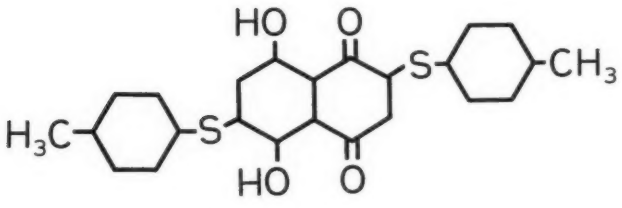
308°F, purple
Gates 1944



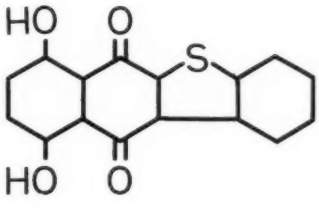
156°F, red
Bruce 1955



271°F, red
Bruce 1955



230°F, red



256°F, red

exception. Naphthazarin is amenable to coupling with active ethylene compounds(*9*); the reaction gives purple-red dyes of low solubility (Table III).

More recently, the chemistry of naphthazarin has been the subject of a comprehensive study by D B Bruce and T H Thomson(*10*). Besides new O-acetyl and O-alkyl derivatives, the authors succeeded in producing an addition product of p-tolyl mercaptan and p-tolyl sulphinate (Table III). This reaction was much easier to effect than with aniline, while with hydrocyanic acid no addition product at all could be obtained(*11*).

In 1927, P Nawiasky and A Krause (*12*) found that one or two hydroxyl groups occupying alpha-positions could be replaced by condensation with aliphatic amines. The resultant compounds (Table IV) dye cellulose acetate in blue-green or bluish red shades, although with quite insufficient lightfastness(1). Similar dyes were later produced by reaction with ammonia(*13*), hydrated or unhydrated furfuryl amine(*14*), and with amines containing sulfonic acid esters (*15*) or phosphoric acid esters(*16*).

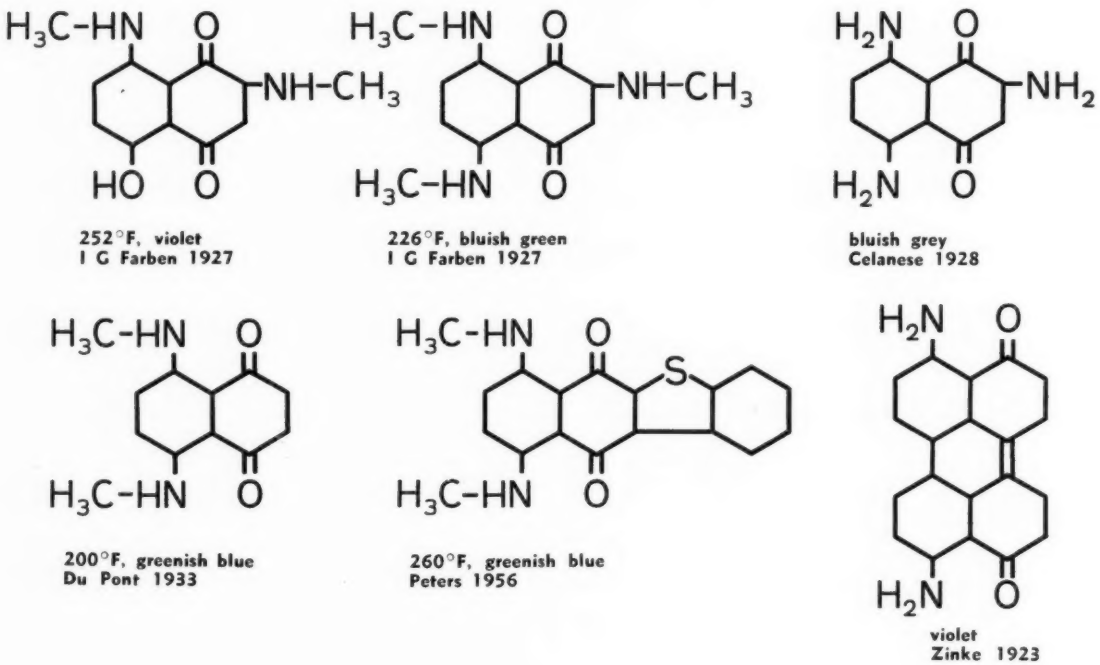
In 1943, D X Klein (*17*) recognized that the reaction could be conducted in a different manner by oxidizing leuco compounds. In this mode of operation, no beta-substitution occurs, and 5,8-dialkylamino-1,4-naphthoquinones are obtained which are characterized by better fastness (Table IV). The condensation product of thionaphthene-2,3-dicarboxylic anhydride and hydroquinone and its aminated blue derivatives(*18*) (Table IV) also belong to this series.

THE NAPHTHAZARIN INTERMEDIATE (TABLE IV)

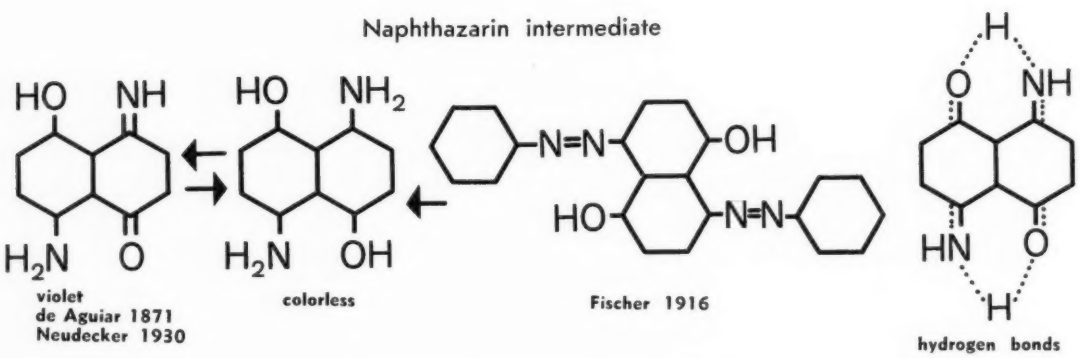
In 1871, A A Aguiar and A G Bayer (*19*) had observed that, during the production of naphthazarin from 1,5-dinitronaphthalene, in presence of sulfur sesquioxide, an intermediate product is formed which dissolves in organic solvents and water to give violet solutions (absorption maxima in ethanol at 609, 562, and 521 mμ); and in concentrated sulfuric acid

TABLE IV

Amination products of the naphthazarin series



Naphthazarin intermediate



gives yellow solutions; while naphthazarin itself has a crimson coloration in the latter solvent. As the intermediate has fairly high water solubility in an acid medium, it is rather difficult to isolate in the pure form. Quite a number of patents can be found according to which it should be possible to obtain the product in the desired purity(*20*). The naphthazarin intermediate must be precipitated from the sulfuric acid solution as quickly as possible, as otherwise hydrolysis and decomposition take place. Only in 1930 was its constitution determined by C Neudecker(*21*). The formula can be written thus: 5-amino-8-hydroxy-1,4-naphthoquinone-1-imine or 4,8-diamino-1,5-naphthoquinone. (See Figure 1). A further proof of this constitution is the procedure evolved in the Sandoz laboratories, starting with 1,5-bis-phenylazo-4,8-dihydroxynaphthalene and proceeding by way of reduction and reoxidation(*21*). Once isolated, the naphthazarin intermediate is relatively stable and must therefore be internally saturated, which points to the presence of hydrogen bonds (Table IV). In fact, the compound appears to contain neither a free hydroxy group nor a free amino group, this supposition being supported by the following facts:

1) The intermediate is insoluble in dilute alkalis.
2) It cannot be coupled either in acid or alkaline medium.
3) It cannot be diazotized.
4) It is much faster to gas fumes on cellulose acetate than 1,4-diaminoanthraquinone.
5) It is comparatively difficult to sulfurize.
6) The violet solution in alcohol does not change color on the addition of acids or alkalis.

CONDENSATION PRODUCTS OF THE NAPHTHAZARIN INTERMEDIATE

In the condensation of naphthazarin with amines, the primary phenomenon is beta-substitution, while on condensation of the intermediate with amines, the yield consists predominantly of the more valuable alpha-substitution product. As early as 1889, R Bohn(*23*) reacted naphthazarin in-

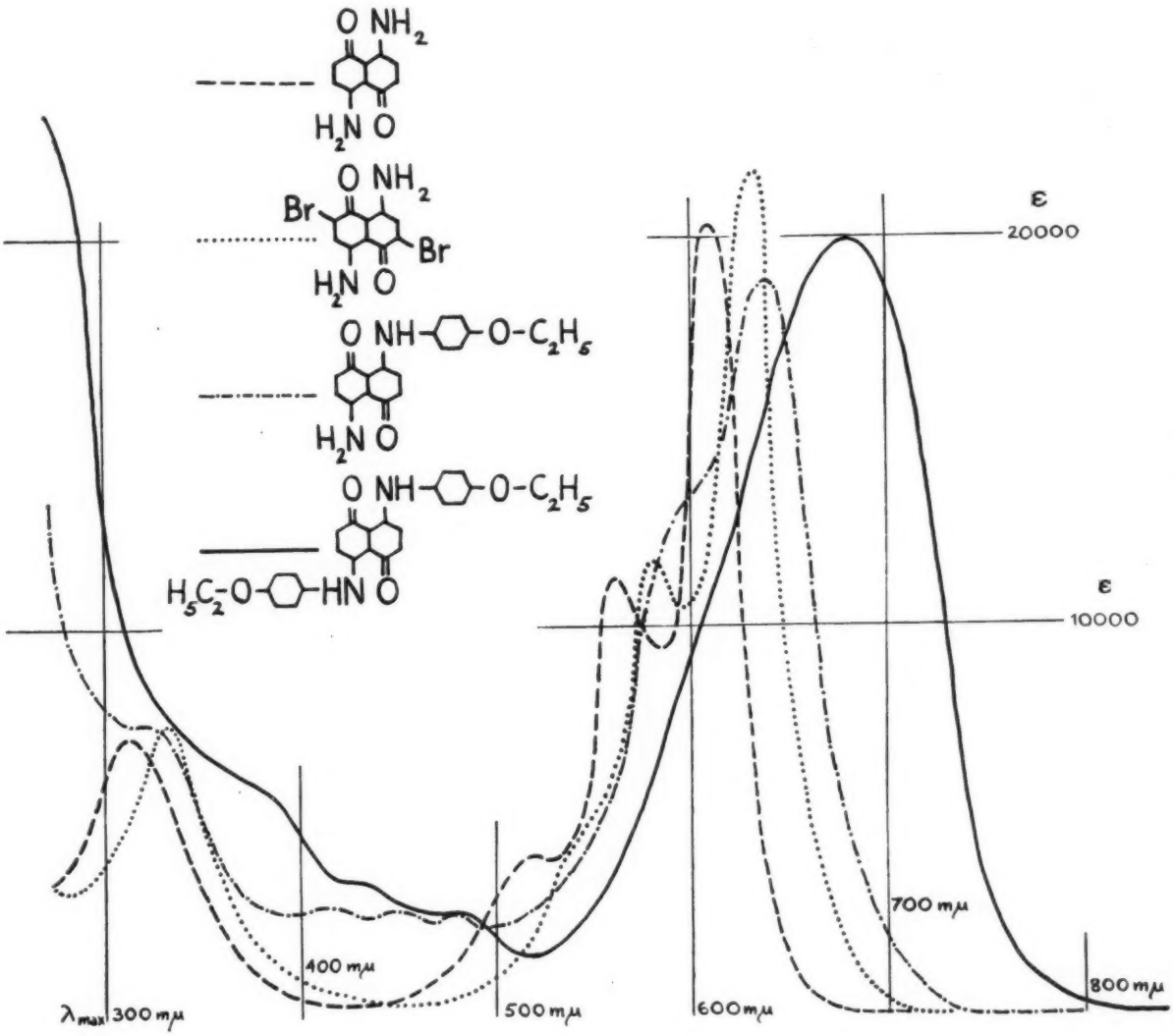


Figure 1
4,8-diamino-1,5-naphthoquinones (spectra in dimethyl formamide)

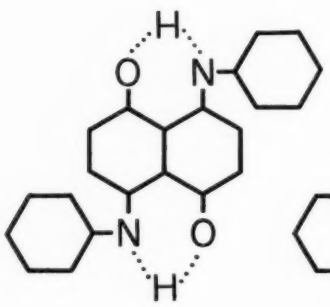
termediate with aromatic amines in glacial acetic acid; the constitution of the reaction products (Table V) was elucidated in 1930 by G Neudecker (*21*). These dicondensation products crystallize in a most attractive form and dissolve in concentrated sulfuric acid to give green-blue solutions. They yield green shades in oils and fats. Because of their slight affinity, they are of no interest for cellulose acetate, but on polyester fibers they give green shades with a lightfastness of 4.

Not long after it was found that, on heating the naphthazarin intermediate in aniline and its homologues(*24*), further condensation products namely grey-blue tricondensation products, are formed (Table V). Neither the di- nor the tricondensation products found employment as such, but they were later sulfonated by patented processes to give acid dyes which dye wool in green and grey shades (Table VI). The sulfonated tricondensation product is listed in the *Colour Index* as CI Acid Black 47, a type especially suitable for wool union dyeings. It has grade 4-5 lightfastness on wool and shows good fastness to carbonizing, but the wet fastness properties are no more than moderate.

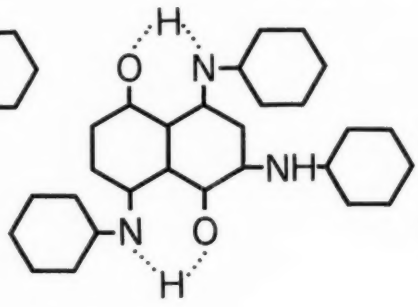
The further development of this field was taken up by C Mettler in

TABLE V

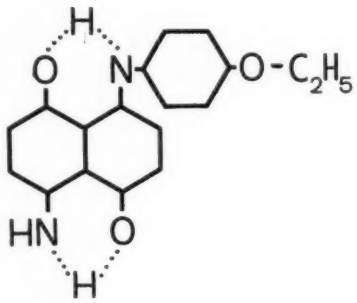
Aryl derivatives of the naphthazarin intermediate



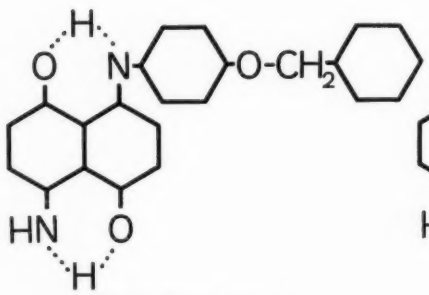
green
BASF 1899
Neudecker 1930



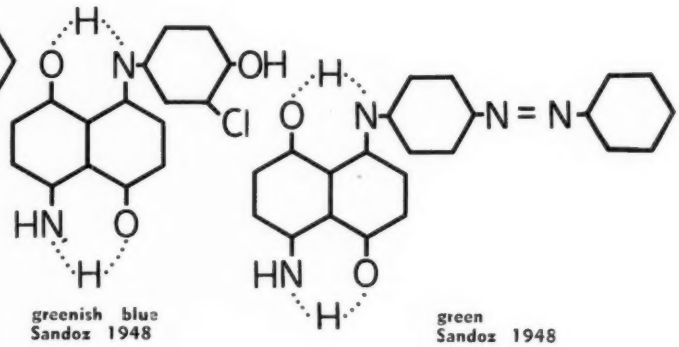
greyish blue
Hoechst 1899
Neudecker 1930



Setacyl Blue Green BS
Geigy 1934

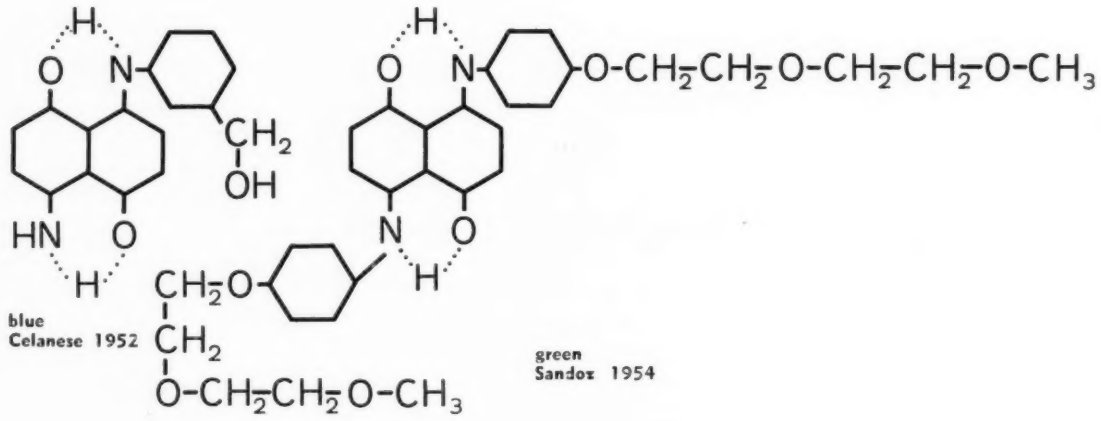


Cellitone Fast Green 3B
I G Farben 1937



greenish blue
Sandoz 1948

green
Sandoz 1948



blue
Celanese 1952

green
Sandoz 1954

1934(*8*). He found that, under milder conditions, monocondensation products could be produced, which in contrast to the dicondensation products, give brown solutions in concentrated sulfuric acid, and dye cellulose acetate a greenish blue (Table V). The dye of naphthazarin intermediate and p-phentidine is the first commercial member of the naphthazarin series to be used for acetate dyeing. The product, a technical mixture, is marked as Setacyl Blue Green BS Supra and possesses a lightfastness of 5 on cellulose acetate and 3 on polyester fibers.

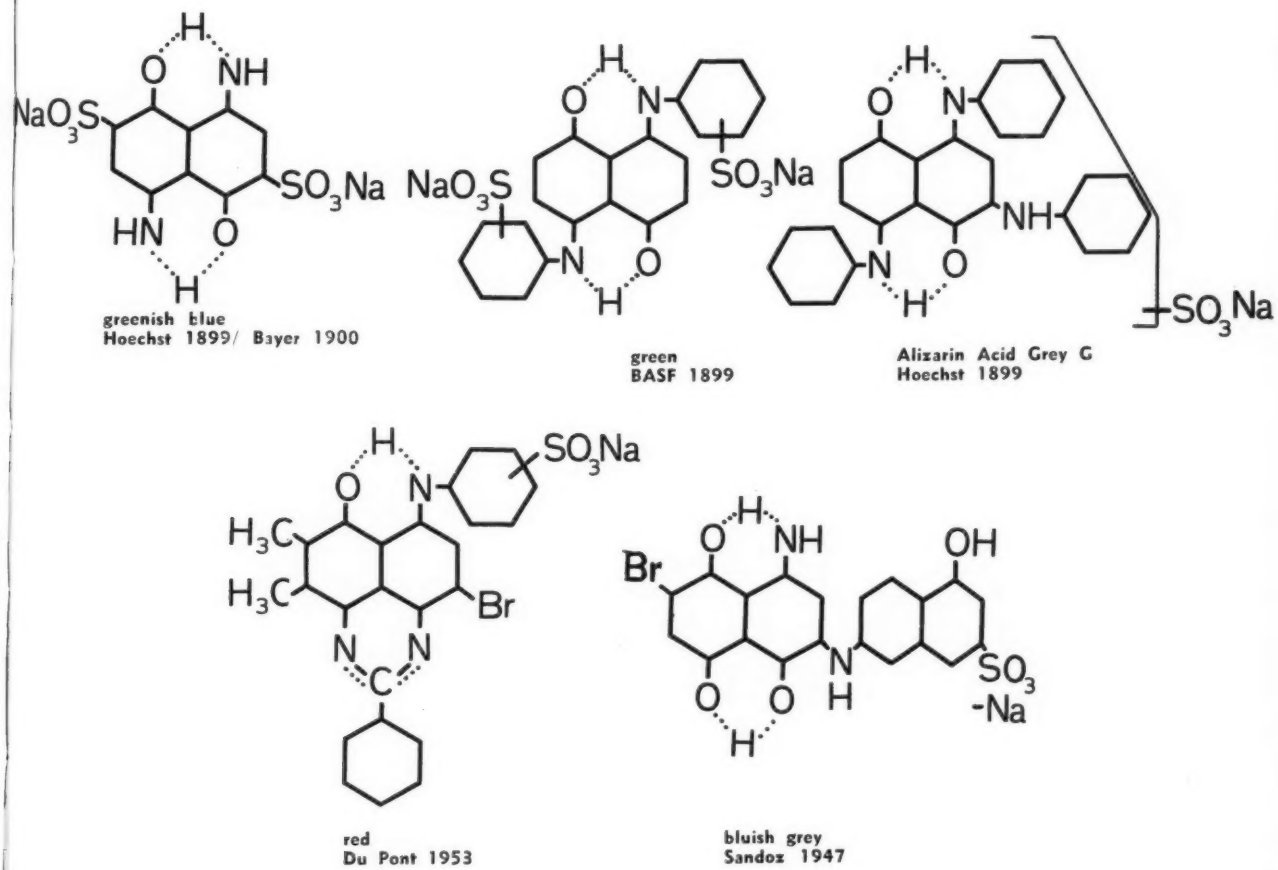
In a short space of time, Du Pont produced similar monocondensation products, eg, with aniline(*25*). However, in glacial acetic acid, naphthazarin intermediate can be condensed only with aromatic amines, probably because the higher basicity of aliphatic amines gives rise to relatively stable acetates. In 1937, R Robl found a way of condensing other amines (*26*). The process consists of producing a stable yellow leuco compound with naphthazarin intermediate and hydrosulfite, condensing it with the desired amine, and reoxidizing the product, eg, with air. Methyl, ethyl, butyl, cyclohexyl and benzyl amines, p-phenetidine, p-aminodiphenyl ether and p-amino-o-chlorodiphenyl ether were named as suitable for the process. CI Disperse Green 1 (Table V) was produced in this way; its lightfastness on acetate is 5-6, and in fastness to wet treatments and gas fume fading it is slightly better than Setacyl Blue Green BS.

We found recently that naphthazarin intermediate can be readily condensed at the boil with aliphatic or cycloaliphatic amines, eg, isopropyl alcohol. In almost every instance, however, the reaction product was found to have insufficient affinity for cellulose acetate. V S Salvin(*27*) states that the reaction products of naphthazarin intermediate and slightly more than the equimolar amount of m-aminobenzyl alcohol, m-aminophenylmethyl carbinol, 2-methyl-5-amino-benzyl alcohol, 4-methyl-3-aminobenzyl alcohol, 2-methoxy-5-aminobenzyl alcohol, 4-methylol-5-aminobenzyl alcohol or p-aminophenyl ethyl alcohol exhibit improved fastness to gas fumes. The dye from m-aminobenzyl alcohol (Table V) dyes cellulose acetate in blue shades and is in fact a trace faster to gas fumes than the corresponding dyes from aniline and p-phenetidine.

A new approach has been to condense the naphthazarin intermediate with aminoazo dyes(*28*). The dyes formed (Table V) are applied to cellulose acetate in the form of their technical mixtures to give green, yellow-green, olive or yellow-brown shades. Especially noteworthy is the dye from p-aminoazobenzene, a bright green with a lightfastness of 5-6. Attempts have been made to halogenate the known monocondensation products in order to improve their gas-fume fastness(*29*). It was found that, in this process, halogen-

TABLE VI

Acid dyes of the naphthazarin series



ation takes place in the phenyl radical in the case of aromatic substituents (Table VII), and as a result the dyes formed offer no special advantages, being only slightly faster to gas fumes and washing.

Whereas all the products described above are technical mixtures, the more recent trend has been to produce homogeneous disperse dyes with improved wetfastness properties. Only a selected number of condensation products, however, possess sufficient affinity. One example is the dye from one mole of naphthazarin intermediate and two moles of 4-aminophenyl-1-[beta-(beta'-methoxy)-ethoxy]-ethyl ether (*30*) (Table V), which dyes cellulose acetate in green shades which are fast to washing and of grade 7 lightfastness. In a similar way, one mole of naphthazarin intermediate is condensed with two moles of 4-amino-4'-octyl-1,1'-diphenyl ether to give a green dye. It does not draw on cellulose acetate nor is it suitable for dope dyeing because of its insufficient solubility in acetone; on sulfonation in 27% oleum at 20-40°C, a dye having comparatively low watersolubility is obtained which shows relatively poor affinity for wool but better affinity for silk, on which it has a lightfastness of 2-3.

HALOGENATED NAPHTHAZARIN INTERMEDIATES

In 1944, V Kartaschoff set himself the task of discovering a bright acetate blue of good fastness to light and gas fumes, that is to say, to nitrous gases and ozone. The blue dyes for acetate which were commercially available in 1944 belonged either to the monoazo class or to that of the substituted or unsubstituted 1,4-diaminoanthraquinone dyes. The former have the advantage of dischargeability and fairly good gas-fume fastness, but are very poor to light. The latter class give very bright shades and some of them are outstandingly fast to light, but they do not withstand gas fumes and are not white dischargeable. Two years later, Kartaschoff(*31*) found among the aminonaphthoquinones a blue which was reasonably fast to light, fast to gas fumes, and very nearly white dischargeable. Recent work has led to the discovery of blue disperse dyes in the anthraquinone series as well; they are fast to light and gas fumes, but on the other hand the shades are rather dull and the dyeing properties not entirely satisfactory. A blue of this type is CI Disperse Blue 27(*32*), a mixture of reaction products obtained with the reactants 4,5-dinitro-1,8-dihydroxyanthraquinone and p-hydroxyethyl aniline.

V Kartaschoff's invention consisted in halogenating the violet naphthazarin intermediate "in statu nascendi". The introduction of two bromine atoms in the molecule causes a marked shift of shade to greenish blue (Table VII). The technical mixture obtained also possesses substantially higher affinity for cellulose acetate than the naphthazarin intermediate, while the pure di-bromine derivative, as would be expected, shows quite insufficient affinity. This mixture of dyes is listed in the *Color Index* under CI Disperse Blue 20; on acetate it shows a lightfastness of 6-7, and on polyester fibers, 5-6. On the latter fibers, which had not been introduced when the dye was marketed in 1946, it has been found interesting for self shades despite its poor wool reserve, as the conventional 1,4-diamino anthraquinones are not fast to light and fade to red, while the new anthraquinone dyes of the CI Disperse Blue 27 type are much duller. Admittedly, the new 1,4-diaminoanthraquinone-2,3-dicarboxylic acid imides of the Latyl Brilliant Blue BG type are of brighter shade and faster to light than CI Disperse Blue 20, but they have limited building-up properties. Owing to the exceptionally high reactivity of CI Disperse Blue 20 and its low solubility in almost all organic solvents except sulfuric acid, its constitution was very difficult to determine. Besides the dibromine compound and other undetermined constituents, the red 2,3-dibromo-5-amino-1,4-naphthoquinone and the reddish blue 2,3,7-tribromo-5-amino-8-hydroxy-1,4-naphthoquinone (Table VII) have been found in the technical mixture by chromatography and identified by analysis. The main constituent, the dibromine compound, can be reduced to the colorless 1,5-diamino-4,8-dihydroxy-3,7-dibromonaphthalene (Table VII). Reduction with hydrosulfite and reoxidation in presence of dilute alkalis gives a water-soluble product which crystallizes in the form of blue needles; it is free from bromine and on analysis its constitution is found to agree with the empirical formula $C_{10}H_{10}O_{10}N_2S_2$.

The next step was to determine the positions of the two bromine atoms in the molecule. Dibromo-diaminonaphthoquinone is not condensable with o-phenylene diamine in ethanol at the boil in presence of sodium acetate. When the dye is boiled for some time in 5% hydrochloric acid, a sublimating dibromonaphthazarin is formed (absorption maxima in ethanol 570, 528 and 491 mμ which is not identical with the known 2,3-dibromo-naphthazarin (Table I). From these two characteristics it follows that the two bromine atoms must belong to different rings of the diaminonaphthoquinone. It was assumed that the bromine atoms entered into positions ortho to the oxygen quinone groups. A fact supporting this view is that, on heating with potassium sulfite, the bromine is not replaced by sulfonic acid groups, as is the case with 1-amino-2-bromoanthraquinone compounds. Synthesis of CI Disperse Blue 20 in a completely different way (Table VII) confirmed this assumption(*22*). As F M Rowe (*33*) has shown, bromination of 1,5-dihydroxynaphthalene in glacial acetic acid yields 2,6-dibromo-1,5-dihydroxynaphthalene. On combining this product with excess diazobenzene in strongly alkaline medium, 1,5-bis-phenylazo-3,7-dibromo-4,8-dihydroxynaphthalene is formed. The same disazo dye is obtained by mild bromination of 1,5-bis-phenylazo-4,8-dihydroxynaphthalene in glacial acetic acid in presence of sodium acetate. The dibrominated disazo dye can be reduced in aqueous dispersion with a hydrochloric acid solution of stannous chloride to the colorless 1,5-diamino-4,8-dihydroxy-3,7-dibromonaphthalene, which on reoxidation is converted into a dibromodiaminonaphthoquinone identical with CI Disperse Blue 20. When bromination of 1,5-bis-phenylazo-4,8-dioxynaphthalene is carried out in 94% sulfuric acid at 80°C, the green solution changes color to yellow and in the same operation is run into icewater, upon which 3,7-dibromo-1,5-diamino-4,8-naphthoquinone (absorption maxima in ethanol at 631 and 579 mμ) is obtained along with brominated sulfanilic acid.

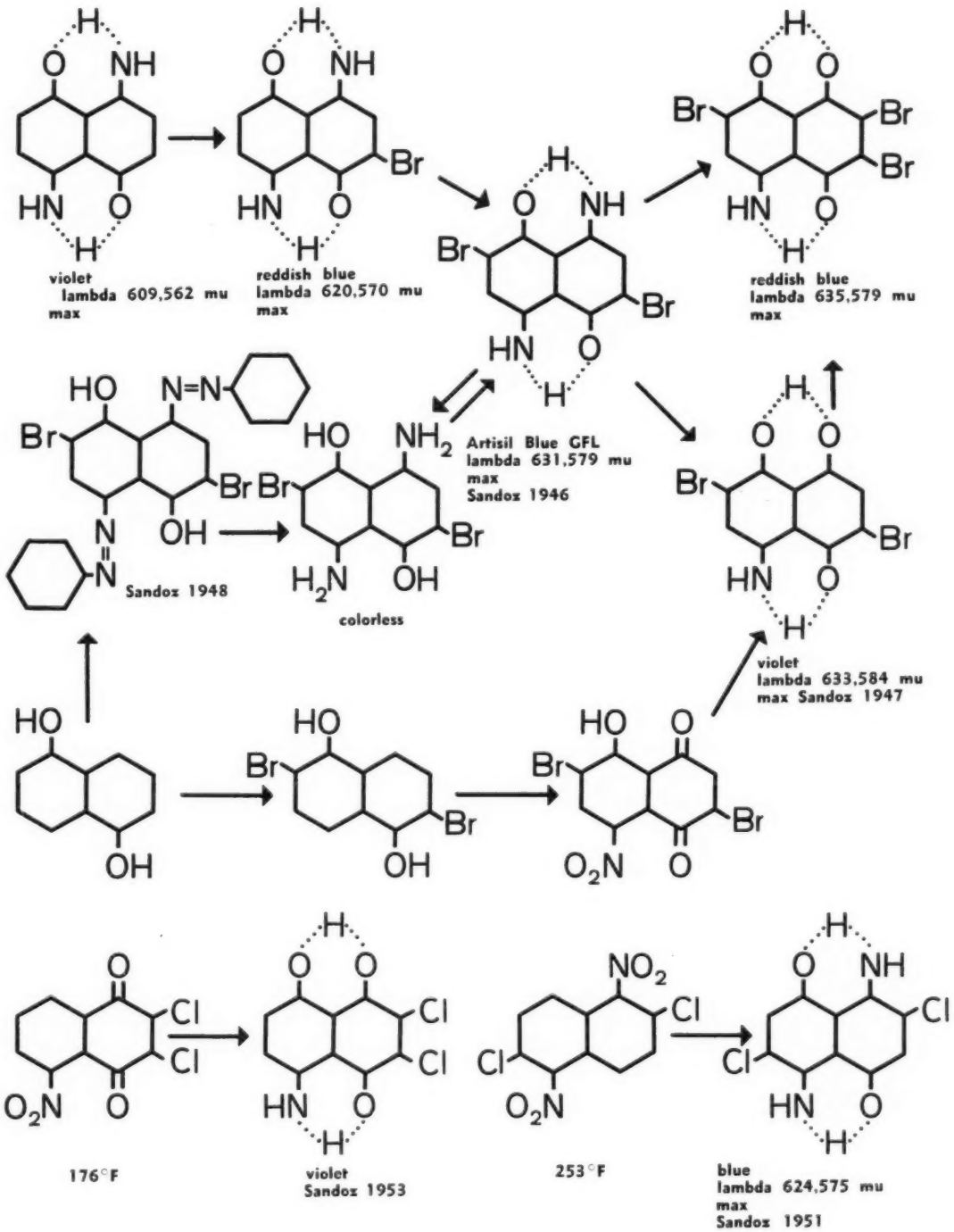
The halogen atoms stabilize the diaminonaphthoquinone molecule to a certain extent. It is therefore possible by mild hydrolysis in 85% sulfuric acid at 80°C to produce from 3,7-dibromo-1,5-diamino-4,8-naphthoquinone the violet 3,7-dibromo-5-amino-8-hydroxy-1,4 naphthoquinone (Table VII), which dissolves in solfuric acid to give crimson solutions (*34*). The corresponding unhalogenated monoamino compound has not yet been synthesized. This violet dye too is very suitable for dyeing acetate, on which it has grade 6-7 lightfastness, and polyester fibers, on which it rates 5-6 to light. A procedure affording proof of constitution(*22*) yields the same dye: starting from 1,5-dihydroxy-naphthalene (Table VII) it leads via 2,6-dibromo-1,5-dihy-

droxy-naphthalene to 3,7-dibromo-5-nitro-8-hydroxy-1,4-naphthoquinone, which is subsequently reduced.

More recently, another violet dye with similar dyeing properties, 2,3-dichloro - 5 - amino - 8 - hydroxy - 1,4 - naphthoquinone(35), has been produced by reacting 2,3-dichloro-5-nitro - 1,4 - naphthoquinone (Table VII) with sulfur sesquioxide. By contrast, the 2,6-dichloro-1,5-amino-4,8-naphthoquinone(*36*) obtained from 1,5 - dinitro - 2,6 - dichloronaphthalene and sulfur sesquioxide shows insufficient affinity for acetate and polyester

TABLE VII

Halogenated naphthoquinoneimides



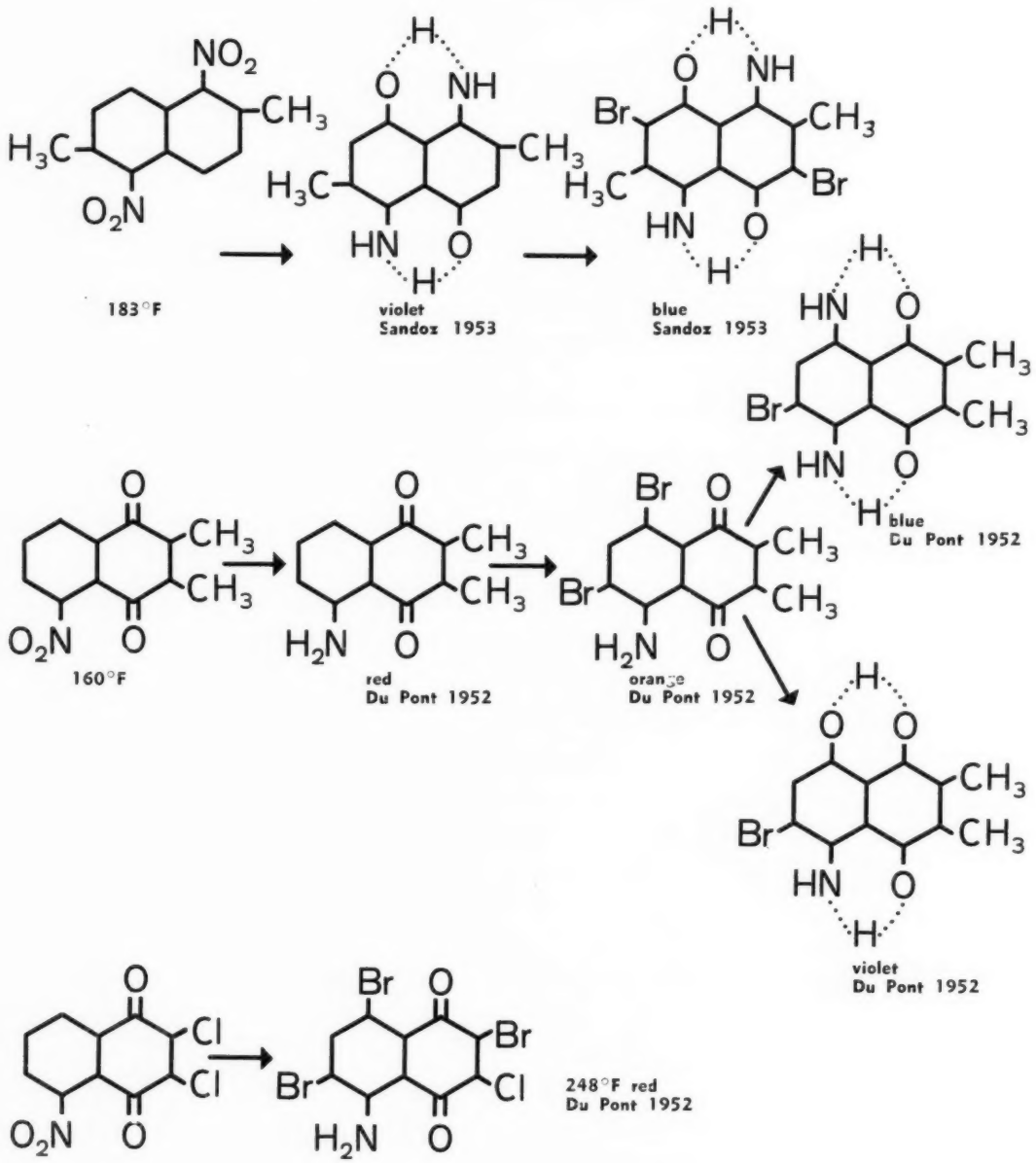
fibers and, an interesting point, is no faster to gas fumes than the 3,7-dichlorine isomers.

Higher halogenated aminonaphthoquinones, such as 2,3,7-tribromo-1,5-diamino-4,8-naphthoquinone, 2-chloro-3,7-dibromo-1,5-diamino-4,8-naphthoquinone, and 2,3,6,7-tetrachloro-5-amino-8-hydroxy-1,4-naphthoquinone, do not dye cellulose acetate, like the bromination product of 2,5,8-trimethylamino-1,4-naphthoquinone(29), which possesses only slight affinity for this fiber, Nitration of 2,6-dimethylnaphthalene gives 2,6-dimethyl-1,5-dinitronaphthalene (Table VIII). This with sulfur sesquioxide forms 2,6-dimethyl-1,5-diamino-4,8-naphthoquinone(37), which is converted by bromination into 2,6-dimethyl-3,7-dibromo-1,5-diamino-4,8-naphthoquinone. This homolog of CI Disperse Blue 20 is of more reddish shade and has practically no affinity for acetate or polyester fibers.

Proceeding from 2,3-dimethyl-1,4-naphthoquinone through 2,3-dimethyl-5-nitro-1,4-naphthoquinone (Table VIII) and 2,3-dimethyl-5-amino-1,4-naphthoquinone, M F Sartori(38) recently succeeded in producing an orange dye for polyester fibers, 2,3-dimethyl-5-amino-6,8-dibromo-1,4-naphthoquinone. With p-toluenesulfonamide it can be converted into the blue acetate dye 2,3-dimethyl-6-

TABLE VIII

Halogenated naphthoquinoneimides (continued)



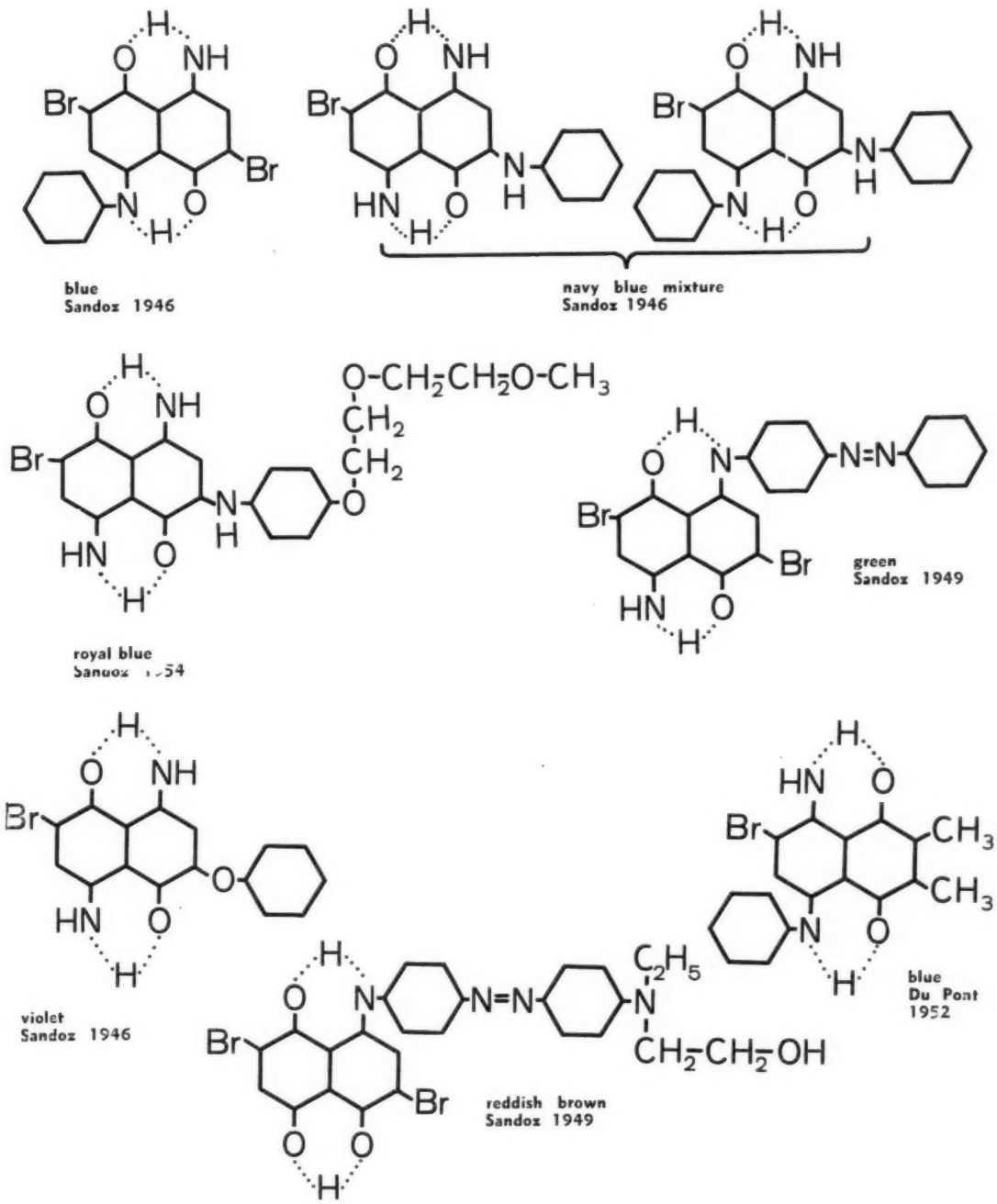
bromo-5,8-diamino-1,4-naphthoquinone or, with boric acid in 20% oleum, into the violet acetate dye 2,3-dimethyl-6-bromo-5-amino-8-hydroxy-1,4-naphthoquinone. In an analogous manner, the same worker(*39*) brominated 2,3-dichloro-5-nitro-1,4-naphthoquinone to arrive at a red dye for polyester fibers, 3-chloro-2,6,8-tribromo-5-amino-1,4-naphthoquinone (Table VIII).

CONDENSATION PRODUCTS OF HALOGENATED NAPHTHAZARIN INTERMEDIATES

A logical extension of this work was to use nuclear halogenated naphthazarin intermediates with their reactive substituents for a number of different condensation reactions. Thus, 3,7-dibromo-1,5-diamino-4,8-naphthoquinone can be reacted with amines to give new dyes(*40*). Again, in this series, the alpha-condensation products have superior lightfastness

TABLE IX

Halogenated naphthoquinoneimides (condensation products)



to the corresponding beta-condensation products. When the last-named dibromodiaminonaphthoquinone is reacted with aniline in glacial acetic acid at 90°C, the greater part of the product is 3,7-dibromo-1-amino-5-anilido-4,8-naphthoquinone (Table IX), which gives yellow solutions in sulfuric acid and shows insufficient affinity for acetate, although the shades obtained are bright and fast to light. On the other hand, if condensation is carried out in an excess of aniline at 60°C, a navy blue reaction mixture is obtained containing 3-anilido-7-bromo-1,5-diamino-4,8-naphthoquinone and 1-amino-3,5-dianilido-7-bromo-4,8-naphthoquinone (Table IX), which dissolves in concentrated sulfuric acid with a red-violet coloration. The lightfastness of such a navy blue is 4-5 on acetate. Its affinity for polyester fibers is inadequate. A preparation giving navy blues on acetate can be obtained by grinding 173 parts of 3,7-dibromo-1,5-diamino-4,8-naphthoquinone, 50 parts of sodium bicarbonate, 48 parts of aniline and 360 parts of a dispersing agent in the dry state for 48 hours at 60°C. Surprisingly, the dye 7-bromo-3-[4'-(beta'-(beta''-methoxy)-ethoxy)-ethoxy]-anilido-1,5-diamino-4,8-naphthoquinone (Table IX) shows unsatisfactory affinity for acetate.

Halogenated naphthazarin intermediates can be condensed with aminoazo compounds in glacial acetic acid on similar lines to give green, olive, brown and grey disperse dyes (*41*) for acetate with a lightfastness of 5 to 4 (Table IX). The formulas given show only the composition of the main constituent of the dye mixtures obtained. When sodium acetate is added to the reaction mass, the rate of condensation is much quicker and more bluish acetate dyes are obtained, due to the fact that the proportion of aminoazo compound condensed in the beta-position has increased.

Halogenated diaminonaphthoquinones can be condensed with phenols with substitution of a halogen atom (*40*). The violet 3-phenoxy-7-bromo-1,5-diamino-1,8-naphthoquinone dissolves in concentrated sulfuric acid with a yellow coloration, has poor affinity for acetate and shows grade 3 lightfastness. Condensation with alcohols such as glycerin and aminobutanol leads to dyes of pink hue which are without affinity for acetate, as their water solubility is already too high.

By reacting 6,8-dibromo-5-amino-2,3-dimethyl-1,4-naphthoquinone with aryl amines, M F Sartori(*38*) obtained further blue disperse dyes for acetate and polyester fibers (Table IX). Another dye from 5-amino-6-bromo-8-anilino-2,3-dimethyl-1,4-naphthoquinone, benzaldehyde and ammonia(*42*) (Table IX) gives fast red shades on these fibers. When the latter compound is sulfonated, acid wool and nylon dyes are formed with improved affinity, brilliance and lightfastness as compared with anthrapyrimidines (Table VI). Halogenated diaminonaphthoquinones are also condensable with water-soluble aromatic amines in aqueous-alcoholic medium in presence of acid-binding agents, such as sodium acetate(*43*). For example, when 3,7-dibromo-1,5-diamino-4,8-naphthoquinone is reacted with J acid, a bromine atom is replaced by the J-acid radical with simultaneous hydrolysis of an amino group, which is indicated in the reaction mixture in the form of ammonium acetate. The condensation products obtained dissolve in water to give red, violet or blue solutions and dye animal fibers in violet, blue to grey shades (Table VI), which can be afterchromed or aftercoppered. A few of these dyes are suitable for application by the metachrome process; the dyeings generally show good wetfastness and are notable for their good fastness to carbonizing.

FUTURE PROSPECTS

The aminonaphthoquinone dyes which are related to the anthraquinone series have been employed in the past 60 years as mordant, acid and disperse dyes. Yet, in spite of their low cost compared with anthraquinone dyes, only a few of the disperse types have found continued acceptance. The reason for this is probably the fact that the naphthoquinone system is less stable, particularly in aqueous medium, than the anthraquinone. This also explains why no satisfactory milling dyes have yet been found in the aminonaphthoquinone series. On the other hand, naphthoquinoid disperse dyes in the dissolved state in hydrophobic fibers are to a great extent protected from hydrolytic agencies and are less susceptible to gas fumes than the aminoanthraquinones in which the equilibrium is displaced in favour of the quinone group and the free amino group. For this reason, CI Disperse Blue 20, since its discovery in 1946, has gained an important place for the dyeing of acetate and polyester fibers. It is to be hoped that this product does not mark the end of progress in this interesting field, and that further rewarding discoveries remain to be made.

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THE IMPROVEMENT OF SELECTED PHYSICAL PROPERTIES OF PARTIALLY ACETYLATED COTTON FABRICS

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PA cotton fabrics produced by the usual acetylating procedures have reduced resistance to flex abrasion and tearing which may limit their usefulness in some applications. However, these physical properties can be improved by the addition of fatty acids, higher than lauric, to the acetylating bath; by premercerization; by addition of softening and lubricating agents; and by swelling with hot acetic acid containing a lubricating agent. Test results indicate that it is possible to obtain treated PA cotton products which have greater flex endurance and tear strength after heating for seven days at 160°C than does untreated PA cotton prior to heating.

INTRODUCTION

DURING the course of the research work at the Southern Utilization Research and Development Division on the development of methods for producing fibrous, partially acetylated (PA) cottons, several reports (*5,7,9*) have been made on the improved heat-, rot-, and acid-resistance of PA cotton. Other reports have been made on the improvement of weather-resistance by acetylating vat-dyed cotton textiles(*2*), and on the physical properties (*8,6*) of PA yarns and fibers. In general, all of these reports show that some physical and chemical properties of cotton may be significantly improved without impairing the basic textile properties of the cotton fibers. However, it was recognized early in the work that some physical properties of cotton fabrics had been impaired by the acetylation treatment. The degree of impairment as measured by laboratory tests could have been considered very detrimental, but as is often the case, laboratory tests did not adequately predict how well PA cotton textiles withstand actual service conditions. It is believed that two factors are primarily responsible for PA cotton lasting longer under conditions of practical service than would be predicted from the results of laboratory tests. The first factor is that any selected physical property is only a component part of the many properties affected by service conditions. Consequently, the importance of any one physical property is minimized. The second factor is that, even though a physical property may have been seriously reduced by the acetylation of the cotton, the level of utility is retained for an extended period of time and is higher than that of the untreated cotton after a short period of use. This is illustrated by Figures 1 and 2.

Figure 1 shows that, although PA cotton sheeting has approximately 15% of the flex abrasion resistance of unacetylated cotton sheeting, it has considerably higher flex life than does the control after only one day of heating at 160°C. After seven-day heating the PA cotton sheeting retained approximately 60% of its original flex life while the cotton retained less than 1% of its original flex life.

Figure 2 shows that similar results are obtained if tear strength is used as an indication of serviceability. The PA cotton sheeting had approximately 40% of the tear strength of the unacetylated control cotton sheeting. After only one day of heating at 160°C the PA cotton sheeting had a resistance to tearing approximately 50% greater than did the unacetylated control cotton sheeting. After seven days of heating PA cotton retained approximately 75% of its original tear strength while cotton retained only 10% of its original tear strength.

These laboratory test results indicate that PA cotton would have an extended service life of approximately seven times that of cotton if used under service conditions equivalent to seven days of heating at 160°C. Specifically, PA cotton had higher flex abrasion resistance and tear strength after heating at 160°C for seven days than did unacetylated cotton after only one day of heating under the same conditions. Similar results may be obtained with other physical properties of cotton fabrics when PA cotton and its control are subjected to laboratory tests for heat- and rot-resistance.

Actual service tests (*4*) have also demonstrated that PA cotton (five-ounce sheeting) lasts four to five times as long as nine-ounce cotton duck. These results have been confirmed by later, more detailed tests which will be reported in a later paper. Field tests on PA cotton sand bags have shown a service life of at least 20 times that of cotton bags mildewproofed with copper-type preservatives. These service tests and others in similar applications gave very encouraging results; however, the commercialization of PA cotton has been much slower than anticipated and a program was undertaken to improve the flex abrasion resistance and tearing strength of PA cotton with the expectation that the market potential could be increased and expanded to other uses by such improvements.

THEORETICAL CONSIDERATIONS

For the purpose of this investigation, flex abrasion resistance and tear strength were considered as one problem. It is realized that, although these properties are somewhat interrelated, it should be possible to improve one property without materially changing the other. However, in practically all applications where one property is important, the other property is also important and it was considered essential that both of these physical properties be improved by a single treatment.

Of major importance is the effect such a treatment has on the other properties of PA cotton, such as heat-, scorch-, and rot-resistance. An acceptable treatment would be one which restores the tearing strength and flex abrasion resistance of PA cotton at least equal to that of unacetylated cotton without detracting from the improvements imparted by acetylation.

The acetylation process is inherently bad for both flex abrasion endurance and tear strength because of the excellent solvent characteristics of acetic acid-acetic anhydride solutions. Such a solution removes essentially all of the natural cotton waxes and produces a harsh, more brittle fiber. The addition of weight as added acetyl groups also produces a more tightly packed fabric which reduces flex endurance life and tear strength. During the acetylation process the cotton becomes highly swollen and plastic. The application of squeeze-roll pressure while swollen causes the yarns and fibers to become more

* One of the laboratories of the Southern Utilization Research and Development Division, Agricultural Research Service, U S Department of Agriculture.

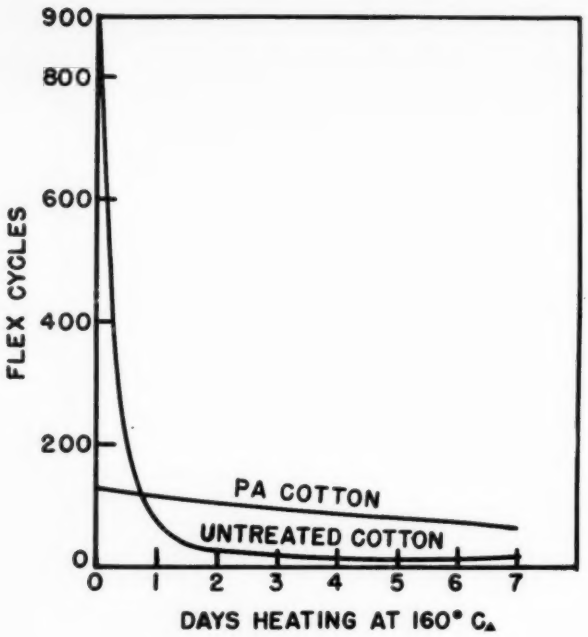

Figure 1
The effect of heating on the flex endurance of PA and untreated cotton fabric

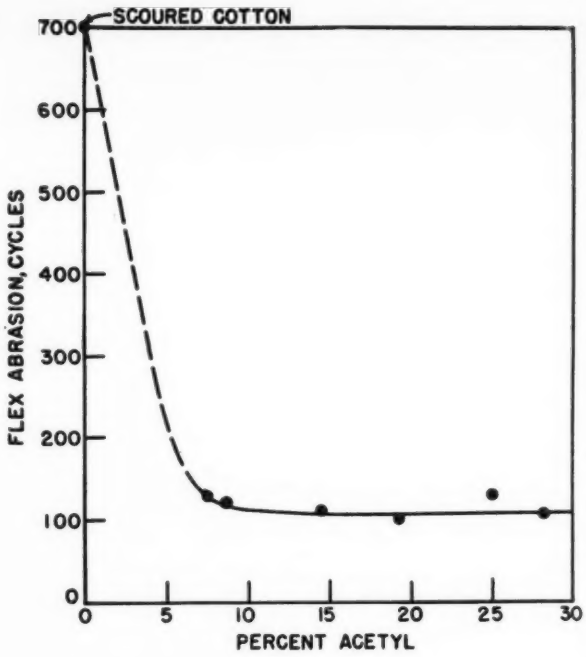

Figure 3
The effect of increasing acetyl content on the flex abrasion resistance of PA cotton fabric

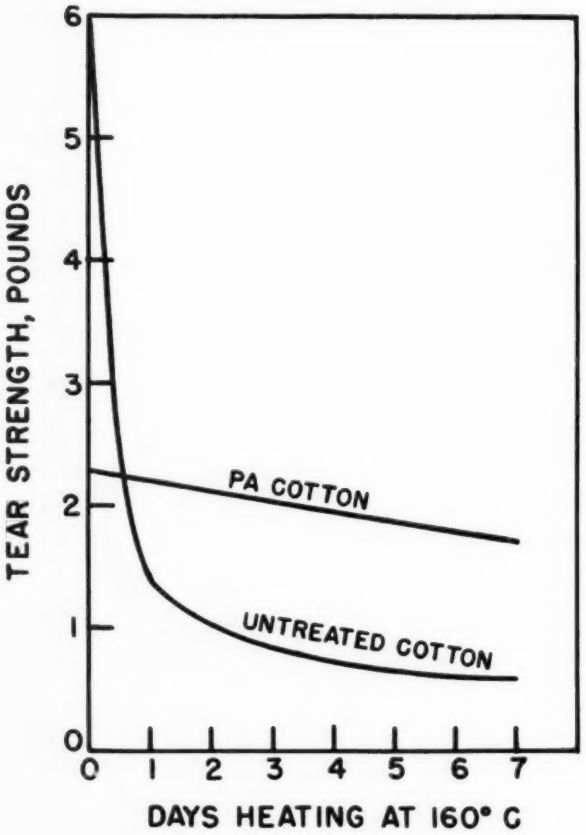

Figure 2
The effect of heating on the tear strength of PA and untreated cotton fabric

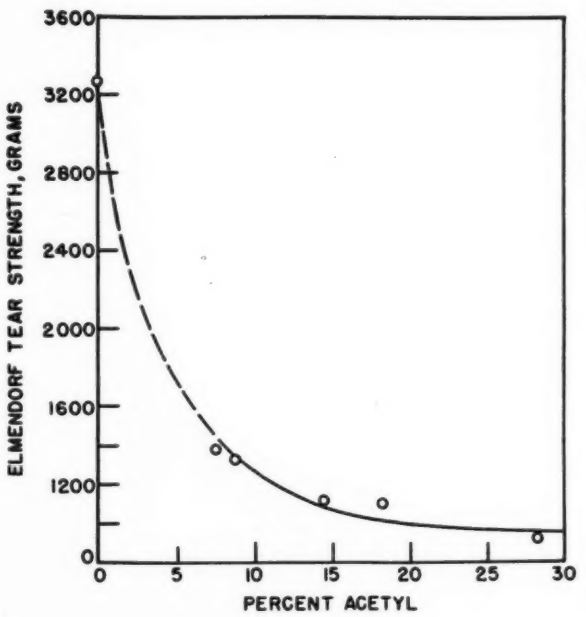

Figure 4
The effect of increasing acetyl content on the tear strength of PA cotton fabric

firmly interlocked, which further reduces mobility. It has been shown also that fiber elongation is reduced somewhat in PA cottons containing less than 25-28% acetyl content. The actual chemical degradation (acid hydrolysis) of the cellulose chain and

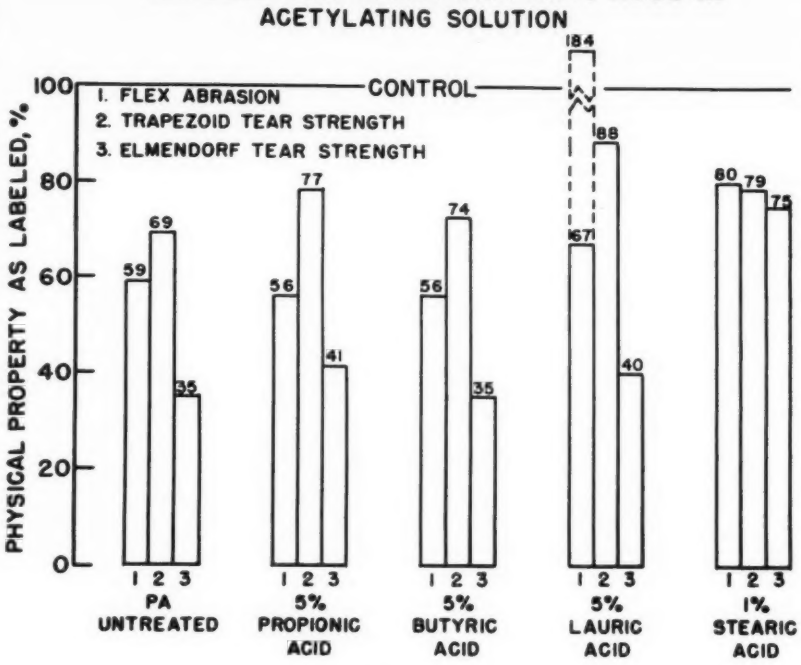

Figure 5

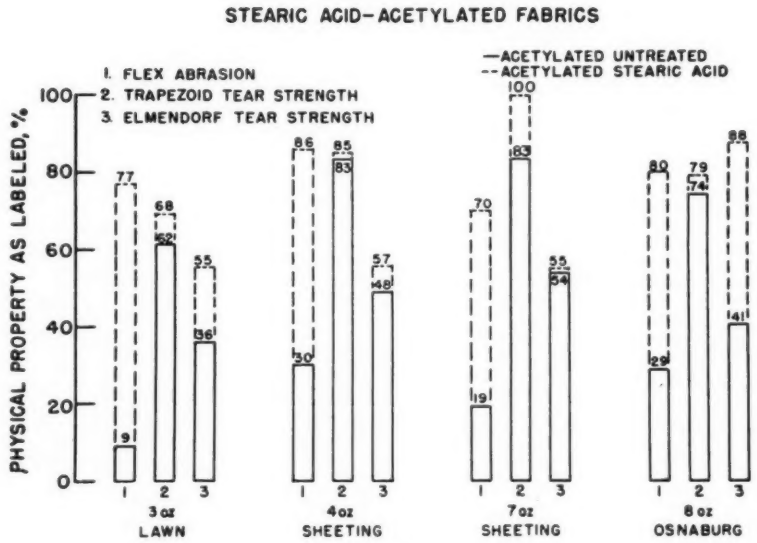

Figure 6

the strain induced by the introduction of acetyl groups into the molecular structure of the cotton cellulose also contribute to reduced flex abrasion resistance and tear strength of PA cotton. Another factor which no doubt also affects these physical properties of PA cotton is the reduced water content of PA cotton. In general it may be stated that cotton acetylated to acetyl contents suitable for most applications has approximately ½ the water content of cotton under the same conditions of relative humidity and temperature. A lower moisture content reduces the plasticizing or lubricating effect of water in native cellulose. In addition, the blocking of hydroxyl groups with acetyl groups reduces the sites where hydrogen bonding may occur.

The combined effect of these factors and others of possibly less importance results in the production of PA cotton fabrics usually having less than 40% of the flex abrasion endurance and 60% of the tear strength of untreated control cotton fabrics. These figures apply only to those PA cotton fabric products produced by the perchloric acid catalyzed processes. Other processes, such as the base catalyzed (potassium acetate) process, may produce products having somewhat different physical properties.

METHODS OF EVALUATION

For the purpose of this investigation it was considered sufficient that three standard laboratory evaluation tests be used to determine the effect of the additional treatment applied to PA cotton fabric:

1) Flex abrasion resistance as measured by the Stoll Flex Abrader (*1a*).
2) Tear strength as measured primarily by the Elmendorf tests (*1b*), and also a few samples as measured by the trapezoid (*10a*), and tongue-tear tests (*10b*).
3) Heat resistance as measured by the retention of breaking strength after subjection to dry heat of 160°C for seven days, using test specimens stripped to 80 yarns width (*1c*).

A few samples were evaluated to determine the effect the treatment had on rot-resistance. This test was not made on all samples because it usually takes up to 26 weeks to complete the tests and also because very little interest has been shown in acetylation as a commercial rotproofing treatment.

In general the results of those tested indicated that the treatments used in this investigation did not seriously affect the rot-resistance of PA cotton except for those treatments which hydrolyze the ester. As has been previously reported (*3*) the deacetylation of PA cotton to only a minor extent causes a serious reduction in its rot resistance.

EXPERIMENTAL PROCESSES FOR THE IMPROVEMENT OF THE FLEX ABRASION RESISTANCE AND TEAR STRENGTH OF PA COTTON

Since the introduction of acetyl groups into the cellulose structure causes a considerable change in the chemical nature of the material, it was considered that the flex abrasion resistance and tear strength of PA cotton fabrics may be improved by reducing the acetyl content to the lowest practical minimum. Figure 3 shows the effect of increasing acetyl content on flex abrasion resistance

and Figure 4 shows the effect on tearing strength.

Contrary to expectations, neither flex abrasion resistance nor tearing strength seem to be a function of added acetyl content within the range evaluated. Consequently, as far as these two properties are concerned, the only practical value of using cotton acetylated to lower acetyl contents is that the product would be slightly cheaper to produce and the physical properties may be slightly easier to improve at lower acetyl contents than at higher values.

If the problems associated with improving the flex endurance and tearing strength of PA cotton are considered similar to those of plasticizing plastics, then it is reasonable to conclude that mixed partial esters of cotton cellulose would be more easily plasticized or lubricated than PA cotton. An effort was made to produce mixed partial esters by incorporating higher fatty acids in the acetylating bath. The data presented in Figure 5 compare the results from normal acetylations made on osnaburg fabric with those obtained using solutions containing 5% propionic acid, 5% butyric acid, 5% lauric acid, or 1% stearic acid in the acetylation bath. Neither flex abrasion resistance nor tearing strength was significantly improved until stearic acid was used. Since the large improvement in flex abrasion resistance obtained with lauric acid (represented by the dotted lines) was from an obvious surface deposit, this sample was extracted with ethyl alcohol to remove the deposit. The flex abrasion resistance after extraction with ethyl alcohol is represented by the solid line and is only slightly higher than that of the control acetylated cotton.

Since stearic acid gave results that were somewhat encouraging, additional fabrics of different weights and construction were acetylated with stearic acid in the acetylation bath. The results of tests on these samples are shown in Figure 6. In all cases there was a significant improvement in the flex abrasion resistance of the samples acetylated in this manner. The effect of the treatment on tear strength is less conclusive, but in general tear strength was improved.

In order to determine the permanence of this type of treatment, acetylated samples of two-ounce lawn were extracted with ethyl alcohol for four hours in a soxhlet extractor. The results of tests made before and after extraction are shown in Figure 7. As can be seen from these test results, the treatment of cotton with acetylating solutions containing 1% stearic acid in the bath would produce products permanent to water washing and this type of solvent extraction. However, when a solvent such as sym-tetrachloroethane, which swells PA cotton and in which stearic

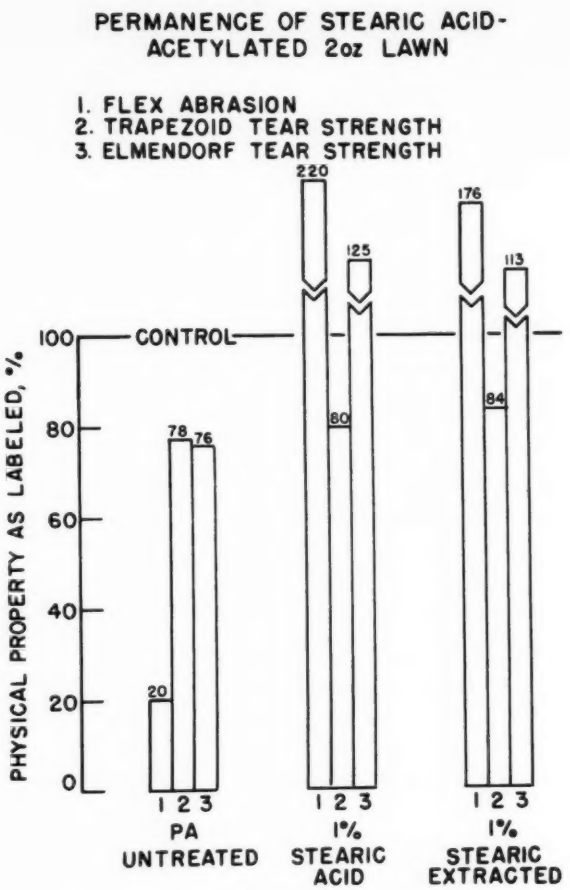

Figure 7

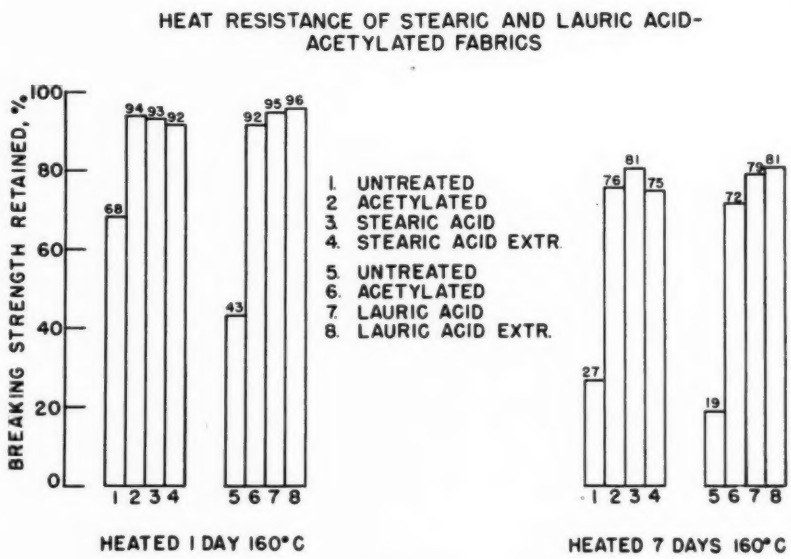

Figure 8

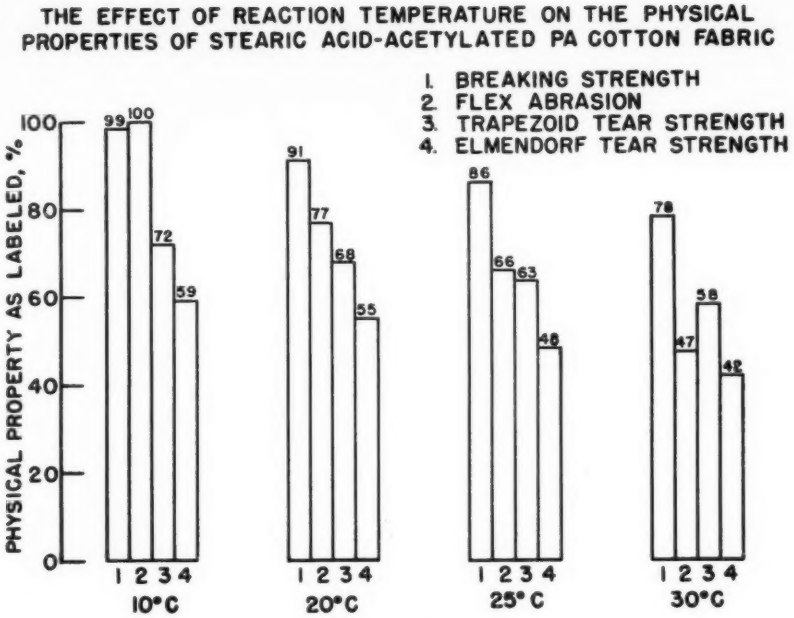

Figure 9

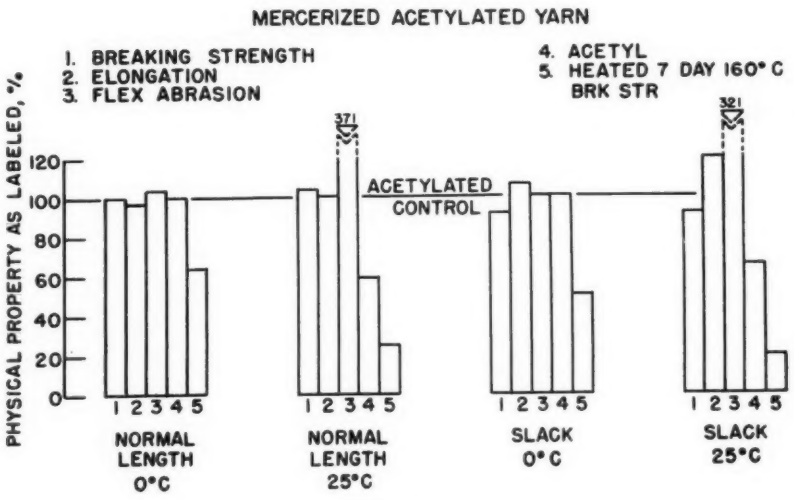

Figure 10

acid is soluble, is used, the added stearic acid is removed, showing that a mixed ester was definitely not formed under the conditions of treatment used to prepare these samples.

The effect of the addition of lauric or stearic acid to an acetylating bath on heat resistance was determined by subjecting samples so acetylated to dry heat at 160°C for one and seven days. The results of these tests are shown in Figure 8. Neither the presence of these acids nor their subsequent removal cause a reduction in the heat resistance of PA cotton.

Additional acetylations were made with 1% stearic acid in the acetylating bath to determine the effect of the temperature of the acetylating bath on the physical properties of the PA products. Figure 9 shows the results of these tests. The acetylations were made at 10°, 20°, 25°, and 30°C under varying conditions of time and catalyst concentration to produce samples of approximately the same acetyl content. These test results show the physical properties as measured are impaired by increasing the temperature of the reacting bath and consequently the lower the temperature of the acetylating bath, the better the physical properties of the PA products.

The physical properties of cotton textiles may be improved by a mercerizing treatment. Samples of PA cotton yarn were subjected to a mercerizing treatment in an effort to improve the physical properties of PA cotton. The results of these experiments are shown in Figure 10. As can be seen, it was necessary that the mercerizing treatment be carried out at 0°C in order that no saponification of the PA cotton would result. Under these conditions, the physical properties, with the exception of heat resistance, of PA cotton yarn were essentially unchanged both by slack treatment and treatment at normal length. If the mercerizing treatment is carried out at room temperature (25°C) approximately 40% of the acetyl groups are removed and heat resistance is reduced considerably. However, flex abrasion resistance is significantly improved and such a treatment as this could be used in those applications where flex endurance is more important than heat resistance.

The use of mercerization as a treatment for improving the physical properties of PA cotton was investigated further by acetylating cotton fabric which had been given a slack mercerization pretreatment. The results of these tests are shown in Figure 11. Mercerization improves the flex abrasion resistance and trapezoid tear strength of both grey and scoured cotton fabric. After acetylation, the grey mercerized fabric retained excellent flex abrasion resistance and trapezoid tear strength, but the scoured mercerized fabric lost most of the improved flex abrasion resistance and after acetylation the trapezoid tear strength was approximately that of the control cotton. Elmendorf tear strength was not improved by the slack mercerizing treatment.

The results of one- and seven-day heat tests on these samples are shown in Figure 12. Heat resistance was not as great as what is considered normal (Sample No. 6, scoured acetylated) but probably would be adequate for most applications since at least 50% breaking strength was retained by all of the acetylated samples after heating for seven days at 160°C.

The use of additive-type softening and lubricating agents was investigated because of the ease and simplicity of applying such treatments subsequent to acetylation. Many materials were screened and the results of tests on five of these materials are shown in Figure 13. These five treatments were chosen to be representative of the results that could be expected from this type of additive treatment. Stearic acid is included

to illustrate the difference obtained when the same material is applied to PA cotton in two ways. No improvement in physical properties results when stearic acid is used as an additive aftertreatment while very encouraging results were obtained when stearic acid was deposited from the acetylating bath while the PA cotton was highly swollen.

The results of heat tests are shown in Figure 14. In all cases the physical properties of the PA cotton are superior to those of the control cotton after heating for seven days at 160°C. The addition of the softening or lubricating agents did not reduce the heat resistance of either one of the samples, and in most tests caused a significant improvement in the physical property as measured.

Since some improvement in the physical properties of PA cotton had been obtained by use of a preswelling (mercerizing) treatment prior to acetylation and also by additives (stearic acid) applied to PA cotton while swollen, an effort was made to combine these two types of treatments. The procedure used was to swell the PA cotton with hot acetic acid with and without an additive softening (or lubricating) agent. The results of these experiments are shown in Figure 15. The height of the open sections represents the percent of the physical property retained prior to heating. The height of the solid sections represents the percent of the physical property retained after heating for seven days at 160°C. The application of hot acetic acid to PA cotton as a swelling agent causes an improvement in flex endurance. Hot acetic acid plus magnesium stearate improve both flex endurance and tear strength. If the hot acetic acid containing magnesium stearate is added immediately after acetylation while the material is in its most highly swollen state, additional improvement in flex endurance and tear strength results. In fact this sample had greater flex endurance and tear strength after heating than did the PA cotton prior to heating. It is believed that such a treatment would be adequate for any application where PA cotton could be used.

The results of limited service tests made on PA cotton treated to improve its physical properties is of possible interest to those who have attempted to obtain the encouraging results of laboratory tests in actual service tests. For these service tests two types of treatments were used to improve the flex endurance and tearing strength of the PA cotton fabrics. The first type of treatment was *preswelling*—mercerization prior to

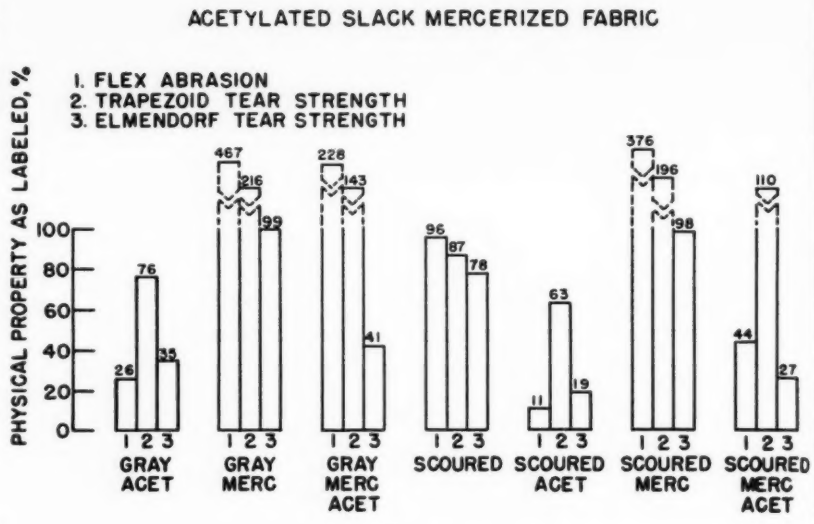

Figure 11

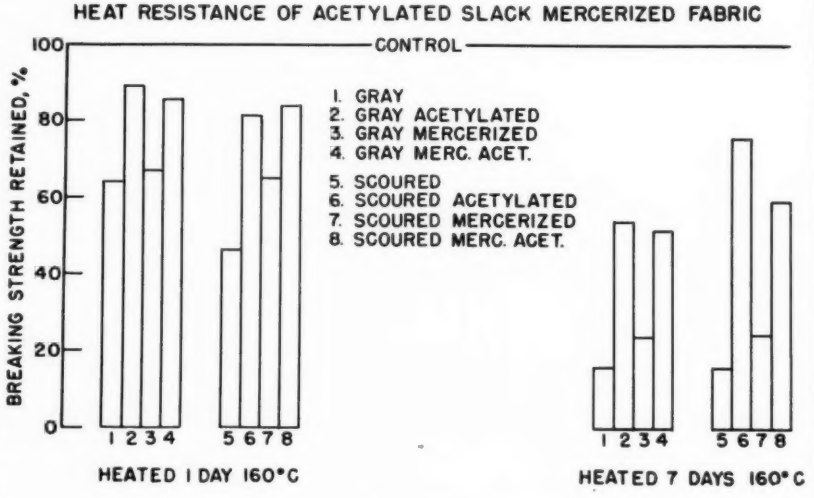

Figure 12

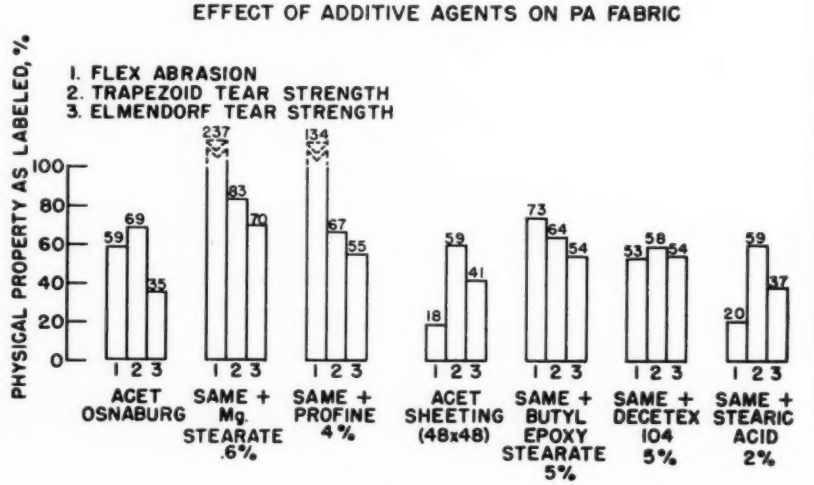
EFFECT OF ADDITIVE AGENTS ON PA FABRIC
1. FLEX ABRASION
2. TRAPEZOID TEAR STRENGTH
3. ELMENDORF TEAR STRENGTH
PHYSICAL PROPERTY AS LABELED, %
ACET OSNABURG
SAME + Mg. STEARATE .6%
SAME + PROFINE 4%
ACET SHEETING (48x48)
SAME + BUTYL EPOXY STEARATE 5%
SAME + DECETEX 104 5%
SAME + STEARIC ACID 2%

Figure 13

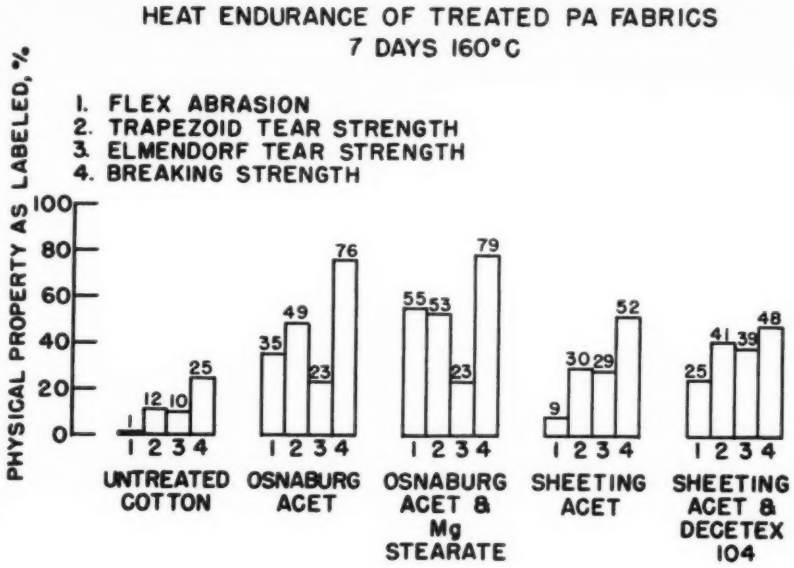

Figure 14

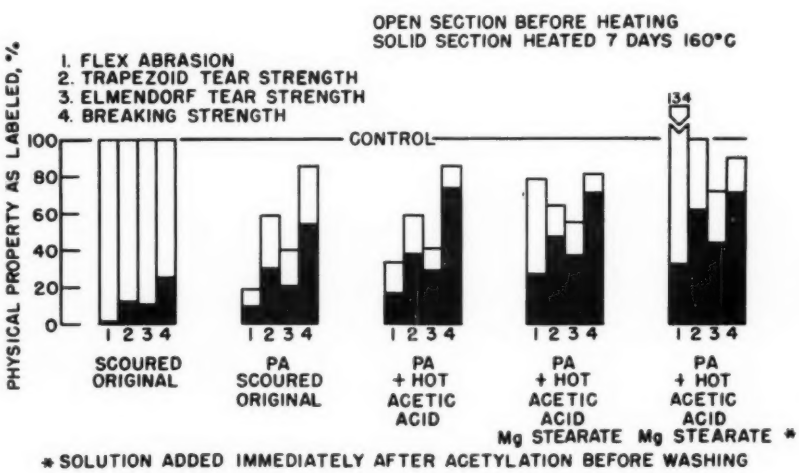

Figure 15

acetylation; and the other type of treatment was *postswelling* with hot acetic acid containing magnesium stearate. The preswelling treatment was varied to include samples mercerized at normal length and width, under slack conditions, and at normal length in the warp direction while slack in the filling direction. The treated PA cotton fabrics along with untreated PA cotton were service-tested as covering material for hot head presses in a commercial laundry. In these tests, the untreated PA cotton lasted as long as the PA cotton treated to improve the physical properties of the product. It is believed that, in this application, where starch is transferred from the garment being pressed to the cover, the absorbed starch completely masks the improvement imparted by the treatment, and consequently results in essentially the same service life.

CONCLUSIONS

The flex abrasion endurance and tearing strength of PA cotton fabrics can be improved without reduction of their heat and scorch resistance by the application of a mercerizing treatment prior to acetylation, or by applying a lubricant during or after acetylation. To get maximum benefits from these lubricants it is necessary to observe specific rules of application, as shown in the text of this publication.

The methods employed in these investigations may be classified as falling into one of three categories: the *first* is simply pre-acetylation mercerization; the *second* is the application of a fatty acid to the fabric during the process of acetylation, thereby acetylating and lubricating simultaneously; and the *third* is the lubrication of the finished PA fabric by applying the lubricating agent from hot acetic acid. The hot acetic acid swells the fabric and encourages the penetration of the lubricant. The selected lubricants were fatty acids of high molecular weight, their insoluble metallic salts, or their organic esters, and analysis shows that these added substances are not chemically combined but rather occluded between fibers in such a manner as to be considered relatively permanent. Therefore, their action may be labeled as physical rather than chemical lubrication.

Of particular interest is the treatment of PA fabric with hot acetic acid containing magnesium stearate. The final product has greater flex endurance and tearing strength after heating seven days at 160°C than does the untreated PA fabric before heating.

ACKNOWLEDGMENT

The authors wish to express their appreciation to Janice Poynot Evans, Lou Wiggins, and Ruby K Worner, who made the laboratory evaluation tests; Norman Duckworth of the American Institute of Laundering, who made the service tests; George I Pittman for the drawings; and especially to Edmund M Buras Jr for his assistance in planning this work and under whose supervision this work was started.

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WHY USE STATIC PRESSURE IN DRYING YARN PACKAGES?

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IN ORDER to answer the question posed by the title of this discussion, it is necessary to review the whole problem of drying and the many types of drying equipment available.

OVEN DRYING———We may dispose of oven-or cabinet-type drying by stating that this is the slowest and most costly method of drying package-dyed yarns. The extra labor for removing packages from carriers, placing them in centrifugal extractors and finally transferring them to ovens or cabinets is usually a sufficient reason to discourage the use of this type of equipment. If a further reason is needed, the slow drying cycle is another disadvantage. The drying cycle for cotton yarns is usually 12 to 18 hours and even longer in some cases.

PORT DRYING———Open-port drying is much more efficient than oven-type drying. In this method the fully loaded wet carrier is placed in a closed-kier pressure extractor for a few minutes and then transferred to the port dryer. In addition to the advantage of less labor involved, the drying cycle is considerably shorter. Using the latest-type equipment available, port drying of cotton packages will average between six and eight hours, depending on diameter and weight of packages, batch size, type of dye tubes or springs used, how well packages are extracted, drying temperature used and atmospheric conditions.

PRESSURE EXTRACTOR - DRYER———In the pressure extractor-dryer method of drying, the carrier of wet yarn is placed in a closed kier, which is connected to a heating unit and a high-pressure, multistage blower. The air flow is 'outside-in' for a few minutes for extracting and is then reversed to 'inside-out' for the drying cycle. The average drying cycle for cotton packages is two and one-half to three hours, depending on all of the conditions listed under port drying.

"SEMI-RAPID" DRYER———This unit is constructed along the same lines as a pressure extractor-dryer except that a spray-type condenser is added between the kier and the blower intake. Some of the air is recirculated and some outside air is drawn into the piping system just ahead of the blower intake. The condenser is actually a combination condenser and water separator. The air is cooled, washed and returned to the blower after the water is separated. This accomplishes two things - it removes most of the chemical contamination from the air stream returning to the blower, and it permits the dryer to be operated at higher temperatures because of the presence of moisture in the air returning to the yarn. The average drying cycle of cotton packages is one and one-half to two and one-half hours, again subject to the conditions listed under port drying.

The drying equipment discussed in the preceding paragraphs is operated with air at atmospheric pressure (approx 15 psia), commonly referred to as *one atmosphere,* and such equipment is limited in efficiency to the restrictions imposed by such operating conditions.

Patented static pressure dryers are available which are much more efficient than other dryers for dyed or bleached-yarn packages.

Drying is the evaporation of moisture and the vaporizing process is best accomplished by the use of heat. The most efficient dryer is the one that can provide the most heat, expressed in BTU, at the yarn where the evaporation is to be accomplished.

The function of the blower in any dryer is to furnish air to act as a vehicle to transport BTU to the yarn. The "semi-rapid" dryer described above requires a 150 hp blower operating at full hp load to produce an inlet capacity of 4,000 cfm at *one atmosphere.* If the dryer is operated at 280°F, the blower will carry 250 lbs of air containing 8,000 BTU to the yarn each minute of operation.

A "static pressure rapid-dryer" requires an average of 100 blower hp when operated at *five atmospheres* (75 psia) and has an inlet capacity of 4,000 cfm. If operated at 280°F, the blower will carry five times the weight of air or 1,250 lbs containing five times the BTU, or a total of 40,000 BTU to the yarn each minute of operation. The average drying time of this unit for cotton packages is 45 to 60 minutes, depending on package size and batch size only. It is not subject to other limitations since it has a closed system.

Thus we see that a "static pressure rapid dryer" is faster, less expensive to operate, and drying time is affected by very few of the variables present in other types of dryers. In addition, it has many other advantages, such as more efficient use of yarn carriers, faster delivery of goods to customer, smaller inventory of yarn, no contamination from atmosphere, and better yarn quality due to shorter exposure to heat.

It will be noticed that we refer only to cotton packages. This may be explained by the fact that the production of package-dyed cotton yarns is greater than is the production of package-dyed yarns of other fibers. Wool and worsted yarns are dried by the same methods used for cotton, but the drying cycles are shorter. With the exception of rayon, yarns made from all of the man-made fibers dry faster than cotton.

FUTURE PAPERS

The following papers will appear shortly in *American Dyestuff Reporter:*

"Durable Creases Produced in Cotton and Resin-finished Cotton Fabrics by an Alkali Process"

"Detection and Geographical Origin of Iron-spotted Raw Cotton"

"Synthetic Resins for Chlorine-fast 'Wash-and-Wear' Finishes"

Proceedings of the

American Association of Textile Chemists and Colorists

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October 5, 1959 No. 20

Metropolitan

OVER 200 members of the Metropolitan Section were guests of Geigy Dyestuffs, Division of Geigy Chemical Corporation, at Ardsley, NY on Friday, September 18. The members were treated to guided tours through the modern laboratory and office facilities of the new Geigy installation at Ardsley and to a buffet dinner.

John A Leddy, supervisor—synthetic fibers, coloristic research, Geigy Dyestuffs presented a paper entitled, "The I-T Process for Applying Cationic Dyes to Acrylic Fibers."

Mr Leddy showed that the I-T Process has a definite application for such fibers as Orlon 42 and Acrilan 16, both as 100% fiber and when blended with other fibers. The "I" stands for Irgasol DA, an anionic agent which is said to form complexes with cationic dyestuffs and the "T" stands for Tinegal NA, a nonionic agent which is said to have no appreciable effect on the rate of drawing of cationic dyestuffs, but which helps keep the cationic/anionic complexes in a state of colloidal dispersion. The I-T process for applying cationic dyes to acrylic fibers reportedly has been in wide use for some time in the United States, Europe and Australia for one-bath union or cross-dyeing processes, where cationic dyestuffs are used in conjunction with anionic dyestuffs in combatting problems of levelness and penetration. The basic principle involved is the utilization of a leveling agent of opposite type to the dyestuff with the object of forming complexes with the dyestuff to reduce the rate of drawing.

The next meeting of the Section will be held at Kohler's Swiss Chalet, Rochelle Park, NJ, on October 16, at which time Norman S Cassell, vice president, Interchemical Corp Research Labs, will speak on "New Horizons for Pigment Printing".

Nominations for the offices of chairman, vice chairman, secretary, treasurer and councilor (two openings) will be offered by the Nominating Committee. Nominations may also be made by petition, accompanied by the signatures of 20 Senior members and a letter of acceptance by the person so nominated.

Niagara Frontier

NIAGARA FRONTIER SECTION held its fifth annual outing on Friday, June 12, 1959 at the St Catherines Golf Club, St Catherines, Ont, Canada. The affair, under the chairmanship of Harold A Miller, Scholler Bros, was attended by 36 members and guests. Heavy rain during the morning and a forecast of continued bad weather was responsible for the small number in attendance.

Approximately 22 members and guests participated in the golf tournament. Thirty-six were present for the dinner, when awards were distributed.

Among members, Mr Miller took low gross honors in golf and was awarded the Section's silver platter. He was followed in the low gross category by Herb Parkinson, 2nd; Cy O'Dowd, 3rd; and Don Noonan, 4th. Low net honors among members went to S J Puliafico with N J Mohoruk, 2nd, H Greisinger, 3rd, and J Wallace, 4th.

Among guests, C Serra turned in low gross; B Hummel was second, and H Holt, third. Stan Smith had low net among guests followed by Alf Foreman, second, and Harold Barnes, third.

Each person attending the outing won a prize.

South Central

SOUTH CENTRAL SECTION held its Fall Meeting at the Hotel Patten, Chattanooga, Tenn, on Saturday, Sept 19, with 90 attending the technical session and 85 attending the banquet. H Gillespie Smith, AATCC vice president (Southern Region), was present.

Speakers at the technical session, which was held in the Red Room, were Samuel L Hayes Jr, Du Pont Fiber Div, who spoke on "Manufacture of Synthetic Yarns with Controlled Dyeability", and R A Brooks, Du Pont Dyes Div, who discussed "Chemical Principles of Dyeing and Finishing".

James King, vice president of Burlington Industries in charge of industrial engineering, spoke at the banquet. His subject was "Trends in Textile Management as They Relate to Modern Management Concepts". The banquet and social hour were held in the Tennessee Room.

New officers were elected as follows:

Chairman—Edwin F Jurczak, Burkart-Schier Chemical Co

Vice chairman—R J Tyrrell, Peerless Woolen Mills

Secretary—Lowell Shive, Arnold Hoffman & Co, Inc

Treasurer—W J Welborn, Riegel Textile Corp

Sectional Committee—Jack McNab, Mac Chemical Co; L R Greenwood, Southern Dyestuff Corp; Charles Braswell, Standard Knitting Mills; J Burkart, Burkart-Schier Chemical Co

Councilors—Robert N Ingram, Lebanon Woolen Mills; J D Mosheim, Crystal Springs Bleachery

Delaware Valley

DELAWARE VALLEY SECTION held its first meeting of the new season on September 25 at the Abraham Lincoln Hotel, Reading, Pa, with approximately 175 members and guests in attendance.

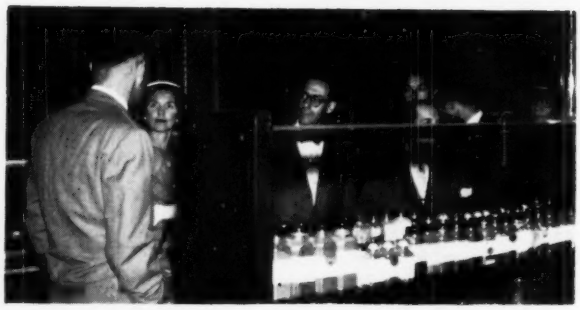
Guest speaker of the evening was Herbert T Pratt, technical representative, Textile Fibers Technical Service, E I duPont de Nemours & Co, Inc, who spoke on the dyeing and finishing of DuPont's new Orlon Cantrece sweater fiber and the dyeing and finishing of Orlon-cotton circular knit underwear.

Following the technical presentation, those assembled were entertained by the Villanova University Glee Club.

METROPOLITAN SECTION FIELD TRIP TO GEIGY PLANT AT ARDSLEY, NY
September 18, 1959

L to r: John A Komninos, chairman, Metropolitan Section; John A Leddy, Geigy Dyestuffs, speaker at September 18th meeting; P J Fynn, vice chairman and technical program chairman Metropolitan Section

L to r (foreground): Harry C Spatz, president, Geigy Dyestuff Div (standing); P J Fynn; Robert C Allison, Geigy laboratory director; J A Komninos. In background, l to r, are Ernest Finan, Howes Publishing Co; Norman A Johnson, editor, American Dyestuff Reporter; and Mrs Johnson



Guided tours of Geigy Dyestuffs' Ardsley, NY, Laboratories highlighted the Metropolitan Section's September 18th meeting

Metropolitan Section members dining in Geigy's cafeteria

Membership Applications

NEW ENGLAND REGION

NORTHERN NEW ENGLAND SECTION

Senior

John A Henry—Tech dir, Exeter Mfg Co, Exeter, NH. Sponsors: P J Wood, A W Mack.

Transfer from Student to Senior

William Choupres—Acushnet, Mass.

John J Swistak—Lowell, Mass.

RHODE ISLAND SECTION

Junior

Donald H Dwares—Asst treas, lab asst, Slater Dye Works Inc, Pawtucket, RI. Sponsors: T F Daly, C Bolger.

CENTRAL ATLANTIC REGION

METROPOLITAN SECTION

Junior

Eugene Passalacqua — Lab asst, Ciba Co Inc, Fair Lawn, NJ. Sponsors: R T McGuire, N C Simcoe.

HUDSON-MOHAWK SECTION

Associate

Edward Van Schassen—Salesman, sales rep, Dempsey Bleachery & Dye Works, Pawtucket, RI. Sponsors: J F Corbett, C H Huggins Jr.

DELAWARE VALLEY SECTION

Senior

Howard H Graff—Head colorist, Aldon Rug Mills Inc, Lenni Mills, Pa. Sponsors: T H Hart, G P Paine.

Franz Hausner—Dir, quality control, & methods engr, Spring City Knitting Co, Spring City, Pa. Sponsors: T H Hart, V H Lawrence.

John M McFarlane—Salesman, W F Fancourt Co, Philadelphia, Pa. Sponsors: R P Rhodes, J Fancourt.

Russell V Zerbe—Mgr, Snow White Bleachery, Royersford, Pa. Sponsors: T H Hart, V H Lawrence.

Transfer from Student to Junior

R Carl Freeman—Chemist, Joseph Bancroft & Sons Co, Wilmington, Del.

Junior

Ronald L Depoe—Textile engr, asst head, dyeing & finishing div, American Viscose Corp, Marcus Hook, Pa. Sponsors: W S Sollenberger, H G Ward.

WASHINGTON SECTION

Senior

Jack G Smith—Research physicist, Textiles Section, National Bureau of Standards, Washington, DC. Sponsors: F H Forziati, L E Fourt.

Edith K Maier—Textile chemist, Union Carbide Chemicals Co, South Charleston, W Va. Sponsors: W R Martin Jr, C W Brown Jr.

Junior

Idelle M Shapiro—Textile technologist, Federal Trade Comm, Washington, DC. Sponsors: F H Forziati, A M Sookne.

Associate

Kathryn M Towne—Prof, home economics, George Washington Univ, Washington, DC.

SOUTHERN REGION

PIEDMONT SECTION

Senior

Arthur J I Harding—Research chemist, Deering Milliken Research Corp, Spartanburg, SC. Sponsors: E D Bolinger, F M Sell.

Douglas P Herlong — Salesman, National Aniline Div, Allied Chemical Corp, Charlotte, NC. Sponsors: H L Shinn, C S McCrorey.

Herbert C Miller Jr—Tech sales rep, E I duPont de Nemours & Co, Inc, Charlotte, NC. Sponsors: H H Feld, M D Haney Jr.

Transfer from Student to Junior

John W Nix — Textile chemist, Greensboro Finishing Plant, Burlington Industries Inc, Greensboro, NC.

SOUTH CENTRAL SECTION

Senior

James I Wright—Salesman, Mac Chemical Co, Knoxville, Tenn. Sponsors: J McNab, D Waller.

Junior

David L White—Laboratory technician, Dixie Mercerizing Co, Chattanooga, Tenn. Sponsors: J L Claiborne, C E Rollins.

SOUTHEASTERN SECTION

Transfer from Student to Junior

Martha C Moss—Textile chemist, Jos Bancroft & Sons Co, Wilmington, Del.

WESTERN REGION

MID-WEST SECTION

Senior

Esther M Cormany—Assoc prof, clothing & textiles, assoc textile economist, Kansas State Univ, Manhattan, Kas. Sponsors: A F Ginter, M M Cooper.

UNCLASSIFIED

Associate

Ezio Dall'Ovo—Chemist, Peodutos Quimicos Dall'Ovo Ltda, Sao Paulo, Brazil.

CORRECTION

YOUR attention is called to an error which appeared on page 41 of the July 27, 1959 issue, in which Frank J Percarpio, in his remarks during the symposium "Practical Experience with the Pad-Roll Dyeing Machine", stated that Bertil Mellbin was the inventor of the machine.

The Pad-Roll Dyeing Machine was invented by N Landquist and C O Eriksson and patented and developed by the Messrs Rydboholn.

AATCC Calendar

COUNCIL, COUNCIL COMMITTEES, RESEARCH COMMITTEES
Nov 19-20 (Hotel McAlpin, New York, NY); Nov 19—Council Committees and Research Committees; Nov 20 (AM)—ECR, TCR; Nov 20 (PM)—Council
Jan 21-22 (Hotel McAlpin, New York, NY); Jan 21—Council Committees and Research Committees; Jan 22(AM)—ECR, TCR; Jan 22 (PM)—Council

NATIONAL CONVENTIONS
Oct 7-10, 1959 (Park Sheraton and Shoreham Hotels, Washington, DC); Oct 6-8, 1960 (Sheraton Hotel, Philadelphia, Pa); September 28-30, 1961 (Buffalo, NY); 1962 (Southern Region)

DELAWARE VALLEY SECTION
Oct 23 (Kugler's Restaurant, Philadelphia, Pa); Dec 4 (Philadelphia, Pa)

HUDSON-MOHAWK SECTION
Nov 20 (Jack's Restanurant, Albany NY); Jan 15, Mar 27 (Chelsea House, Tribes Hill, NY); May 20 (Ladies Night); June 24 (Annual Outing)

METROPOLITAN SECTION
Oct 16, Nov 20 (Kohler's Swiss Chalet, Rochelle Park, NJ); Jan 15, Feb 19 (Hotel New Yorker, New York, NY); Mar 18, Apr 22 (Swiss Chalet); May 20 (Ladies Night—Swiss Chalet); June, 1960 (Outing)

MID-WEST SECTION
Nov 7 (Bismarck Hotel, Chicago, Ill)

NIAGARA FRONTIER SECTION
Dec 11 (Annual business meeting, Buffalo, NY)

NORTHERN NEW ENGLAND SECTION
Oct 16 (Lexington Inn, Lexington, Mass); Dec 4 (Joint symposium with ASME Textile Engineering Div. Smith House, Cambridge, Mass); Jan 15 (Woodlawn Golf Club, Newton, Mass)

PIEDMONT SECTION
Jan 22-23 (Poinsett Hotel, Greenville, SC); April 2-3 (Hotel Robert E Lee, Winston-Salem, NC); June 3-4 (Outing—Ocean Forest Hotel, Myrtle Beach, SC); Sept 23-24, 1960 (Hotel Charlotte, Charlotte, NC)

RHODE ISLAND SECTION
Dec 4 (Annual Meeting—Johnson's Hummocks Grille, Providence, RI); Jan 29 (Johnson's Hummocks); Mar 25 (Providence Engineering Soc); April 29 (Student Night); June 24 (Outing—Metacomet Country Club; Sept 23, 1960 (Management Night); Oct 28, 1960 (Providence Engineering Society); Dec 2, 1960 (Annual Meeting—Johnson's Hummocks)

SOUTHEASTERN SECTION
Dec 5 (Atlanta Athletic Club, Atlanta, Ga)

WESTERN NEW ENGLAND SECTION
Oct 23 (Annual Meeting—Rapp's Restaurant, Shelton, Conn); Dec 4 (Hartford, Conn)

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STUDENT CHAPTERS

Alabama Polytechnic Institute, Bradford Durfee College of Technology, Clemson College, Georgia Institute of Technology, Lowell Technological Institute, New Bedford Institute of Technology, North Carolina State College, Philadelphia Textile Institute, Rhode Island School of Design

Abstracts

Preparation and Bleaching (of Cotton Goods)—How Preparation Methods Developed

Campbell, K S, *Textile World 109, 74-7, August, 1959*

Immediately following the desizing operation in the preparation of cotton goods, there normally comes an alkaline scour. Desizing and scouring probably remove all of the pectins and proteins, about 70 percent of the ash, and the greater part of the motes and pigment.

The progress or efficiency of scouring is usually measured directly on the scoured material by determining such properties as residual wax, ash, and cellulose content.

The scouring or boiling-off of cotton has undergone very considerable change in the last 125 years. At one time, a lime boil in an open kier followed by a soda boil was employed. Later, an acid sour was used between the lime and soda ash treatments. Still later, caustic soda was substituted for lime, in a single boil. Soda ash is still used when there is need of a milder scour (eg, in bleaching fabrics containing colored yarns).

Other substances sometimes added to the caustic boil are sodium silicate and tetrasodium pyrophosphate (as sequestering, emulsifying and dispersing agents); organic sequestering agents (eg, Versene T); and soap and synthetic detergents (cotton wax emulsifiers).

In the past 25 years, continuous systems of scouring and bleaching have become more and more prevalent, and now account for a majority of all cloth bleached.

The basic feature of continuous scouring is the exposure of caustic-saturated cloth to a saturated air-free steam atmosphere in a J box. It has been determined that with 2% caustic (on weight of fiber) a two-hour steaming is necessary to produce adequate absorbency of the fabric, while with 7% caustic, 15 minutes of steaming is sufficient. Mote removal, however, requires over 40 minutes steaming time to produce a mote-free fabric in the subsequent peroxide bleach.

The author points out that the amount of caustic based on cloth weight required for satisfactory bleaching results in a one-hour steaming time (normal in commercial practice) is approximately the same (about 3%) as is required for a kier boil that takes eight to 12 times as long.

Cotton must not be exposed to atmospheric oxygen while saturated with hot caustic soda, or oxycellulose may be formed.

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Why Color Matchers Differ

Anon, *Textile World 109, 67, August, 1959*

Recent experiments conducted by the National Bureau of Standards give clues as to why experienced color matchers see the same shade differently.

The purpose of the tests was to define the color response of the average human eye. The physical properties of color standards can be measured by strictly physical methods; however, to compute a valid numerical specification of an observed color, the eye's response to that color must be determined.

Tests were made by means of plaques colored gray by two methods. A simplex gray was produced by mixing black and white pigments. A complex gray was made by mixing yellow, green, purple and white pigments.

When a person of normal vision views these plaques so that the samples subtend an angle of 10° in daylight, the simplex gray appears redder than the complex gray. However, at a distance from which the samples subtend an angle of 2°, the simplex gray appears greener than the other.

This phenomenon occurs because the retinal image of the samples at the 10° position covers both the macula and a large portion of the retina, while at the 2° position the retinal image falls wholly within the eye's macula, which is yellow. The effect is similar to placing a yellow filter in front of the eye for the 10° position.

Consequently, the 10°-field results depend primarily on lens pigmentation, and the 2°-field results depend not only on the lens but to a large extent on macular pigmentation.

The age of the observer was found to influence his color response in this test. Thus, the youngest observers described the simplex gray as redder than the complex gray at both the 10° and 2° positions. By contrast, the oldest observers saw the simplex gray as greener in both positions.

Consequently, when color matchers disagree on a match, the angle of view and the differences in age must be taken into consideration.

Heat-setting in Seconds: Infrared Units on the Tenter

Anon, *Man-made Textiles 35, 68, Feb, 1959*

An infrared heating plant recently developed by General Electric provides uniform heating for the rapid heat-setting of woven and knitted fabrics of nylon or Terylene. This is a comparatively new application of infrared heating to the dry heat-setting processes, and it may be achieved in times of only 7 to 15 seconds duration.

The experience gained from several installations has proved that infrared equipment has advantages over hot-air setting of synthetic fibers on various types of tenter machines. Infrared plant is much cheaper, and the rapid setting avoids oxidation and discoloration of the fabric. Better quality of set fabric can be obtained in a shorter running time. The same plant will post-set fabric after dyeing or printing.

The author describes two nylon setting plants that have recently been installed by British finishing firms. The heating of the fabric is by infrared radiation from sheathed wire elements mounted in panels suspended above the fabric passing through the tenter. The element ratings are carefully graded from the center outwards, the outer elements being rated a little higher to compensate for the greater heat losses from the edges of the fabric. The elements are backed with reflector sheeting to direct the radiation, and there are movable side reflectors which are mechanically operated and which can be positioned so as to maintain the efficiency of the plant, regardless of the width of the fabric.

The temperature of each setting plant is controlled by a thermocouple placed close to a heating element and connected to a sensitive electronic controller, which switches the elements on and off to maintain a constant temperature within a given degrees. The temperature conditions are automatically recorded. There are special safeguards to protect the fabric from damage from overheating.

Infrared panels may also be used for the drying of wet fabrics on the tenter after padding.

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The Remazol Linkage

Bohnert, E, *Dyer 121, 779-80, May 8, 1959*

The reactive group of the Remazol dyes is the vinylsulfone group. In contrast to the mechanism of the chloro-triazinyl reactive dyes, in

which the reaction with the cellulose fiber is a *substitution* (replacing hydrogen in the hydroxyl groups), the reaction of the Remazol dyes is an *addition*, catalyzed by alkali.

The Remazol dyes are freely soluble in water, and in neutral solution can be boiled without danger of hydrolysis. When applied in cellulose materials in the presence of alkali, they become attached to the fiber by an ether linkage. The linkage can be split, however, if strong alkali acts on the dyeing at high temperatures.

When washed at the boil with neutral synthetic detergents, Remazol dyeings show no loss of color or bleeding. They do not compete with vat and insoluble azo dyes, however, for articles requiring severe washing. The lightfastness of the individual dyes ranges from good to excellent.

Remazol dyes may be applied to wool in a Glauber's salt and sulfuric acid bath. The basic properties of the fiber enable it to react with the dyes. The dyeings are said to have good levelness and wet fastness.

Polyamide and acrylic fibers can also be dyed with these dyestuffs in an acid bath, but silk is dyed in an alkaline bath, using soda ash.

Remazol dyes are also suitable for printing on cellulose.

●

"No Shrink" Cellulose

Anon, *Chem & Eng News 37*, 23, Aug 24, 1959

Hartford Fibers, a division of Bigelow-Sanford Carpet Co, has announced a new "polynosic" fiber. Its chief feature is its unusual dimensional stability, which virtually eliminates shrinkage, wet or dry.

The fiber, "Zantrel", is said to be based on a new concept in cellulose chemistry. The new process, according to its manufacturers, produces cellulose molecules "twice as long" as those of rayon, and "more compactly spaced in a more homogeneous, orderly manner".

The properties of this new fiber include high wet strength, low breaking elongation, high modulus, high elastic recovery in the wet state, and relatively low degree of water absorption. These properties eliminate both initial and progressive fabric shrinkage in laundering, and are said to give characteristics of crispness, fullness and drapeability.

The term "polynosic" is an anglicized version of "polynosique", which is now used in Europe to mean "many fibers".

Zantrel is the result of research in a number of countries. It will be made in the U S by Hartford Fibers under a license contract negotiated recently with Societe Chimiotex of Switzerland. This company services existing technological agreements between the foreign firms that produce the fiber and the rest of the world. These include Compagnie Industrielle de Textiles Artificiels et Synthetiques (CTA) of France, Fabelta of Belgium, and Societe de Viscose of Switzerland. Zantrel was developed by the four firms under Japanese patents.

Hartford Fibers will start production of the new staple fiber in 1960. Until then, it will import the product made by CTA. Burlington Industries has been experimenting with it for the past two years, and is said to be making finished fabrics of all-Zantrel, as well as blends with other fibers.

●

Antistatic Finishing of Textiles

Buehler, M, *Ciba Rev* #132, 25-9, June, 1959

Synthetic fibers are extremely liable to accumulate static from the moment they leave the spinnerets. Hence they are given a protective finish or dressing in the very first stages of their manufacture, to counteract the troublesome effects of electrification. It is normal, in fact, for manufacturers of synthetic fibers to supply their products in this condition.

The occurrence of static in textiles can be suppressed by ionizing the surrounding air with the aid of radioactive or electric static eliminators. These have the disadvantage of being effective at short range only.

Antistatic chemical finishes fall into two classes: nondurable (applied in course of processing and subsequently washed out) and durable (applied in conjunction with the final finishing treatment).

All surface-active substances show a distinct ability to reduce the tendency of man-made fibers to develop static. The type of structure which makes a substance surface-active (ie, a combination of a hydrophobic hydrocarbon residue and a hydrophilic terminal group) plays a decisive part in the control of static. The various surface-active agents differ greatly, however, in respect of their antistatic effectiveness, which is enhanced by double bonds in the molecule and by the number of their polar, polarizable and salt-like linkages.

The mechanism of the action of these substances is described at some length by the author.

An efficient antistatic agent, designed to act only by increasing the conductivity of the fibers, should satisfy these two conditions, he says:

1) Deposition of individual molecules on the fiber surface in parallel order and normal to the fiber axis.

2) Polar, that is, hydrophobic/hydrophilic structure. Presence of groups with mobile electrons which respond to an electric field, like an efficient dielectric, by opposite polarization.

The greatest problem presented by antistatic dressings is their washfast fixation on the fiber. Since static charges are purely a surface phenomenon, a finish must be durably attached to the fiber *surface* if it is to serve its purpose. Diffusion of the antistatic agent into the fiber, similar to diffusion of a dye, would be equivalent to its removal from the fiber to the washing liquor, and therefore equivalent to a loss of effectiveness.

A bibliography of 33 references to the literature is attached.

●

Dyeing and Finishing Terylene in Canada—a General Progress Report

Straw, A, *Can Textile J 76*, 47-50, Aug 7, 1959

A considerable amount of Terylene staple is being dyed in top form for later blending into Terylene/wool fabric. All the dyeing is done at high temperature and it is now on a generally sound basis, giving no more trouble or difficulty that the usual dyeing processes.

A moderate amount of Terylene/-wool is being dyed in piece form. In general, the two-bath dyeing method is being used. The Terylene is dyed with the aid of a carrier in the first bath, and after a clearing treatment the wool is dyed.

Terylene/viscose "wash-and-wear" fabrics are being dyed in the piece by either one- or two-bath methods, generally using carriers.

Regarding filament fabrics, some progress has been made in dyeing Terylene tricot. This tends to be warp-streaky and requires the use of leveling dyes. Pressure dyeing has marked advantages here, since the leveling properties of dyes at 250-260°F are very much better than at 212°F. There is as yet, according to the author, no equipment in Canada suitable for dyeing heavy or tightly woven Terylene fabrics, but this is being installed, he says.

Of the various carriers employed, orthophenylphenol is cheap and easy to use, but has an adverse effect on lightfastness unless completely removed by washing. A "readily-dispersible solid carrier", believed to be a mixture of dimethyl terephthalate and benzanilide, is described. This is expensive but has no effect on lightfastness, it is said.

In regard to setting Terylene, a shirting fabric requires a temperature of 375°F for good dimensional stability the author states. Lingerie fabrics

may be set at 350°F.

To obtain a full white on Terylene under atmospheric dyeing conditions, a chlorite bleach is necessary, followed by a fluorescent brightening agent.

•

Aspects of Pigment Dispersion Related to Usage (Mercer Lecture)

Moll, I S, *Dyer 121*, 999-1000, June 19, 1959

The speaker outlined theoretical concepts of pigment dispersion and discussed both aqueous and non-aqueous systems and both textile and nontextile usages.

The production of mass pigmented rayon involves the suspension of particles small enough to pass through filters. Several filtrations of the spinning dope are necessary, the final one having an effective pore size of 2-3 microns. The particle size of the pigment therefore needs to be considerably smaller. To prevent agglomeration of the pigment particles, surface-active agents are added to the paste.

In contrast to viscose pigmentation, where the whole of the medium is either in solution or highly hydrated, the printing of textiles with pigmented compositions involves the use of emulsions containing hydrophobic resin binders. The speaker described a typical oil-in-water system, and pointed out that minimum effect on the hand of the fabric can only be achieved by using a minimum quantity of binder, so that maximum tinctorial strength is needed from the pigment. At the same time, particles need to be fully bound to the fiber to obtain good fastness to mechanical treatment, and the pigment should therefore penetrate into the finest interstices of the cloth and should not be filtered out on the surface.

On a strongly hydrophilic fiber such as a cellulosic cloth, deposition of printing paste can be visualized as a penetration of the total system into the structure, with absorption of water by the fibers. The rate at which this occurs depends on the capillarity of the cloth structure, the effective viscosity of the system, and the surface tension of the continuous phase. Rapid take-up of water by the fibers renders them oil-repellent, and the resulting concentration of both the resin binder and the separately emulsified thickener (eg, white spirit) causes breakdown of the emulsions. At this stage, white spirit floods away from the system by virtue of its low viscosity, but the much more highly viscous resin copolymer is held in the interstices of the cloth surface, together with any excess of cross-linking agent in the water phase. Drying removes water and other volatiles, and subsequent baking cross-links resin to the fiber, with the pigment remaining in the complex layer on the fiber surface.

The process results in the pigment being fully bound, this being supported by the generally better rubbing fastness of oil-in-water systems as opposed to water-in-oil.

As the level of particle size decreases, shades become brighter and the rubbing fastness is improved.

•

The Reaction of Wool with Sodium Hydroxide in Concentrated Salt Solutions

McPhee, J R, *Textile Research J 29*, 303-10, April, 1959

Dilute sodium hydroxide solutions react readily with wool, the first points of attack being disulfide bonds of cystine and amide side-chains. Treatment of wool with weakly alkaline solutions decreases its tendency to felt, and a moderate degree of attack markedly decreases the wet strength but not the dry strength of wool fibers. The feltability of wool can also be reduced by treatment in conc solutions of sodium hydroxide.

Much better shrinkproofing effects than these can be obtained with sodium or potassium hydroxide in organic solvents and, since wool is not damaged by such treatments, these processes have found industrial application.

Methods for shrinkproofing with aqueous solutions would have advantages in cost and simplicity for industrial use over those using organic solvents. It is desirable, therefore, to try to make aqueous alkaline solutions behave like those in organic solvents.

A possible reason for the lack of damage in alcoholic sodium hydroxide solutions compared with similar aqueous solutions is that the swelling is much less in the former. The fact (already established) that the addition of sodium chloride decreases the swelling of wool in aqueous sodium hydroxide solutions suggests that this may be a way of preventing damage.

The present paper describes studies of the reaction of wool with sodium hydroxide in conc aqueous salt solutions as the possible basis of a shrinkproofing method.

Samples of wool treated in 1.25 *N* NaOH solutions for 15 mins at 25°C. The effect of adding 19 different inorganic salts, using both 2 *M* and saturated solutions, was studied. The effects of these treatments on the wool's shrinkage, yarn strength, fiber swelling, bursting strength, etc, are listed in tabular form.

The protective effect of many of the saturated salt solutions was found to be comparable with that of organic solvents, although the rate of shrinkproofing was slower in the aqueous solutions. Better resistance to felting, without further damage to the wool, was obtained by increasing the time of treatment.

Saturated sodium thiosulfate solutions appear to have been the most efficient in protecting the wool. Saturated sodium chloride would be more economical, but was somewhat less effective. A yellowing of the wool which occurs in the NaCl solutions can be prevented by addition of an inorganic reducing agent.

The author discusses the theoretical aspects of this protective effect. Twenty-five references to the literature are cited.

•

Procion Dye Staining for Differentiation of Skin and Core of Viscose Rayon Fibers

Kato, K, *Textile Reseach J 29*, 661-4, August, 1959

The author refers first to various staining techniques, including the silver staining method, which have been developed in the past for revealing microscopically the skin-core effect characteristic of viscose rayons. When either direct or basic dyes are used as stains, it is generally accepted, he says, that the skin-core differentiation in every case takes place solely by virtue of physical phenomena such as diffusion and absorption of dye molecules.

A new microscopical technique for differentiating the skin-core structure is now described. Slide preparations mounting fiber cross-sections are stained with an alkaline solution of Procion Black HGS, which is a dye recently marketed by I C I as a chemically reactive dye for cellulose fibers. This technique is found to furnish a staining entirely selective for the skin area in a simple and rapid way.

Since it is well established that Procion dyes do react chemically with cellulose under alkaline conditions, it is highly probable that the differential staining produced by this new technique is due to a definite difference existing between the skin and the core with respect to their chemical reactivity toward the dye employed. This differentiation mechanism appears to be quite different from that which is generally accepted to be the case in the previously mentioned techniques using ordinary dyes.

Typical results are presented for

several types of cellulose rayons (textile rayon, all-skin tire cord, cuprammonium, and Fortisan) showing various staining behaviors with Procion Black. It is seen that these results are in good agreement with those obtained by other stain methods.

The same procedure, when applied to a variety of fibers other than cellulosics, is found to give positive staining reactions only with wool, silk, regenerated protein, and Vinylon fibers.

Although most of these findings are as yet not satisfactorily explained, reactive dye staining of this kind seems to be of much promise in the field of fiber microscopy.

●

Thermal Comfort of Clothing of Varying Fiber Content

Werden, J E, Fahnestock, M K and Galbraith, R L, *Textile Research J 29*, 640-51, August, 1959

This study was made to test the commonly held assumption that the thermal comfort of clothing worn at elevated temperatures and humidities is affected by the fiber content of the fabric. Fabrics were chosen to compare natural *vs* man-made and high *vs* low moisture regain fibers.

Women in complete outfits of clothing of nylon, cotton, acetate and Arnel were tested at temperatures from 70° to 94°F at both medium and low humidities. The objective measures used were total weight loss, evaporative weight loss, weight gain of clothing, rectal temperature and skin temperature, and time of onset of sweating. A subjective comfort vote was also taken.

None of these indices showed significant differences among fibers in relation to the thermal comfort of clothing. The most significant effects found in any of the data were the increases in clothing assembly weights during the tests at the 94°F, 80% r h condition. These increases were proportional to the original weights of the assemblies (cotton 555.9 g, nylon 425.4 g, acetate 732.4 g, Arnel 705.1 g) regardless of the fiber type.

The temperature and relative humidity had a decided effect on the comfort votes and total weight losses of the subjects at 88° and 94°F environmental temperatures. The r h affected the evaporative weight losses at all four environmental temperatures.

There were large differences in the average total weight losses of the subjects in the 94°F and 80% r h environment which were related to the weights of the assemblies. In relatively still air (25 ft/min or less) the heavier assemblies apparently caused more sweating, which resulted in greater weight losses. The subjective comfort votes were consistent and correlated well with the objective skin-temperature measurements.

Similar results were obtained when the subjects were exposed to rapid changes in environment. Either with or without large quantities of sweat on the skin and in the clothing, no difference in thermal comfort as measured by comfort votes and skin temperatures could be attributed to fiber content.

Sixteen references to the literature are cited.

●

Fibers

Grove, C S, Jr, Casey, R S and Vodonik, J L, *Ind Eng Chem 51*, 1172-5, Sept, 1959

The authors, in their annual review, described a large number of fibers which have recently appeared in industrial markets. A few of these merit special attention.

A polypropylene fiber has been introduced by a number of companies. It has a high tenacity, about equal to that of linear polyethylene, and will find uses for rope, filters, etc.

Courtaulds (Ala) has developed two cross-linked cellulosic fibers, Corval and Topel, which are said to be chemically and physically different from other cellulosics. Fiber 40, made by American Viscose, is also a cross-linked rayon.

Type 64 Dacron, brought out by Du Pont, is said to have improved resistance to pilling and good dyeing characteristics. It is also said to have double the strength of wool and greater abrasion resistance.

Refrasil, a fibrous form of silica, has been developed as a light-weight insulating material for use around jet engines. A potassium titanate inorganic fiber, introduced by Du Pont, is also suitable for high-temperature insulating uses, as well as for filters, protective clothing, etc.

A new polyester fiber, Kodel, was announced last year by Eastman Kodak Co. Another one, Teron, will shortly be made by the Celanese Corp. of America.

A new fiber called Kenaf, which will soon be available in Haiti, is made from the bark of stalks of a fast-growing plant resembling the hollyhock. Kenaf products are lighter, stronger and more durable than jute, and can be used not only for bags but also for ropes, carpets, linoleum backing, etc.

Recent world production figures for the various fibers, all in millions of pounds, are given: cotton 18000, wool 2500, flax 1600, rayon 5000, nylon 450, other synthetics 300. Viscose and acetate fibers present the most serious competition to cotton, the report states.

The man-made fibers have found many industrial uses, replacing cotton in some instances. Tire cords and tarpaulins are the principal markets, which also include fishing nets, belts, and insulating materials for the electrical industry.

The growth of the nonwoven fabric industry is also stressed.

Sixty-two references to the literature are included.

●

Binders for Nonwoven Fabrics

Sherwood, N H, *Ind Eng Chem 51*, 907-10, August, 1959

Binders may be separated, by their physical state at the time of application, into the two broad classifications of dry or wet binders.

The dry systems are made up of thermoplastic fibers or powders. Wet systems include solutions, of both aqueous and solvent types, as well as polymer dispersions or emulsions.

Thermoplastic polymers in powder form have not been very successful, as it is difficult to distribute the powder into the web uniformly. Thermoplastic fibers, however are practical, and are used commercially. The actual bonding is produced by passing the web between heated rolls, or by the use of infrared or hot-air heating. Thermoplastic fibers have some advantages as binders (eg, in heat-sealing the web to other materials), but are generally not suitable when high strength at minimum binder weight is required. The fabrics also lack flexibility.

Solvent solutions of binders are seldom used, owing to the expense of solvent recovery systems and the fire and toxicity hazards. Water solutions of gums, starches, etc, have a limited use as binders where stiffness can be tolerated in the web.

The water-based emulsion systems, which include the polymer latices, are the most versatile and popular of the nonwoven binders. Their ease of handling and general freedom from hazard make them attractive, the author states. He lists several types of latex used as binders: butadiene/acrylonitrile, butadiene/styrene, acrylic, polyvinyl chloride, polyvinyl acetate, polychloroprene, and natural rubber, and gives in tabular form the properties of saturated nonwoven fabrics showing the influence of each binder type. He states that the nitrile latices have come closest to meeting all the requirements of a good binder.

A number of very serious problems

must be solved if nonwoven fabrics are to continue to grow as predicted, according to the author. The amount of binder required must be reduced (it usually weighs as much as the fiber). The tensile strength must be improved (substituting stronger fibers, eg, nylon, for cotton does not help). There is frequently failure of the adhesive bond between polymer and fiber.

Another problem is that of color retention. Nitrile latices tend to discolor when subjected to extended heat and light aging. Acrylic latices are much better in this respect, but are less resistant to washing and drycleaning. Research work is continuing on the solution of these problems.

Fifteen references to the literature background for nonwovens are cited.

●

The Effect of Commercial Laundering on Cotton Wash-wear Fabrics

Borahetty, H C, *Textile Recorder 77*, 72-3, June, 1959

The introduction not long ago of chlorine-resistant resins has finally made the resin treatment of white cotton shirting fabrics possible. The immediate effect was to open up a whole new market for the textile industry, and the consumer was told that at last a shirting fabric was available which combined the wash-wear qualities of synthetic fibers with the comfort of cotton.

Unfortunately, shirts finished with the new resins, when laundered by commercial methods, soon lost their wash-wear characteristics and were returned to the owner perceptibly yellowed. Continual commercial washes led ultimately to fiber damage. Wash-wear cotton shirts laundered at home, by contrast, were not affected at all.

The immediate reaction of the industry was to blame the chlorine used in commercial laundry bleaches for the damage. Actually, according to the author, most commercial laundries use only minimal concentrations of chlorine, and the damage to wash-wear cotton shirts is, in fact, caused by the high temperatures (up to 160°F) commonly used by commercial laundries, the prolonged wash time (up to 30 minutes) and the final acid sour which is added to neutralize any alkalinity contained in the wash water or left from soap. These conditions combine to make a single commercial white washing equal in effect to 20 home launderings, and contribute to the chemical removal of the resins and their mechanical breakdown.

Resin manufacturers are currently investigating a number of new resins that hold promise of being able to withstand chlorine damage even after exposure to commercial laundering. These new resins include the acetals, the epoxides, and the triazones, all of which are described by the author.

The acetals, which are quite recent, are said to cross-link cellulose, giving durable crease resistance. The epoxides are expensive and have less relative crease resistance, but can be improved by blending with dimethylol ethylene urea.

The triazones are classified as cyclic ureas but differ from cyclic dimethylol ethylene urea in having an extra nitrogen atom in the ring. They are said to show little damage on either commercial or household washing.

The author gives the standard washroom formula for white family work recommended by the American Institute of Laundering.

●

The Mechanism of Pilling

Gintis, D and Mead, E J, *Textile Reseach J 29*, 578-85, July, 1959

Pilling has long been recognized as a problem in staple fabrics. With the advent of the new synthetic fibers the problems became more acute. A considerable degree of success in controlling pilling has been obtained through studies on the effects of yarn and fabric variables (yarn twist, fabric tightness, heat-setting, etc) on pilling. However, relatively little attention has been devoted to the mechanism of pilling formation.

Studies of the mechanism of pilling have demonstrated that pilling propensity is determined by the rates of fuzz formation, entanglement, and pill wearoff. Motion pictures of fabrics subjected to an abrading action showed that the abradant acted on exposed fiber sections to pull loops which then opened to form fuzz. A pill formed quickly when the fuzz density reached a critical level. The fibers were then twisted and entangled, gradually involving nearby fibers. As the abrading action continued, pills wore away.

Techniques were developed which permitted independent quantitative study of each of these three phenomena. The physical properties of several textile fibers were correlated with their behavior in these tests. Interfiber friction and bending stiffness were important factors in fuzz formation. Entanglement tendency was correlated with denier, cross-sectional shape, and bending stiffness. The rate of pill wearoff was governed by the abrasion resistance and tenacity of the fibers involved.

The general applicability of this mechanism has been demonstrated with modified polyester fibers. The reduced pilling tendency of staple fibers with a ribbon cross-section was attributed to a directional bending which reduced their entanglement tendency. Heat-setting increased bending stiffness, which reduced pilling by lowering fuzzing tendency. The most pronounced effect on pilling tendency of polyester fibers was obtained by changes in abrasion resistance, which affected the rate of pill wearoff.

Six references to the literature are cited.

●

High-Strength Regenerated Cellulose Fibers

Smith, D K, *Textile Research J 29*, 32-40, Jan, 1959

The last few years have brought substantial improvements in the physical strength properties of certain regenerated cellulose fibrous products, notably the type of high-strength rayon yarn used for tire cord. This trend has been so striking as to reach the point where the present-day high-strength rayon is an entirely different fiber from the product known only five to ten years ago.

The improvement in properties is primarily attributed to the combined use of physical and chemical actions to accomplish controlled crystallite development and orientation in the spinning filament. Beneficial use has been made of various types of chemical regeneration-retarding agents to prolong the plastic-gel state, thereby facilitating heavy stretching along with dehydration of the coagulated filament to yield a highly consolidated and uniaxially oriented structure prior to complete regeneration.

The action of these retarding agents and their effect on the spinning operation are explained by the author. The relation of current spinning practices to mechanical properties attained in the final filament are outlined and interpreted in the light of filament cross-sectional structure (illustrated by fiber photomicrographs), secondary swelling properties, and differential dyeing characteristics.

The author discusses the possibility of producing a "truly launderable rayon staple", with superior wet strength, increased resistance to fibrillation and abrasion, improved dimensional stability and increased resistance to chemical degradation, while retaining the desirable properties of rayon (good moisture absorbency and dyeing qualities). He

suggests that to achieve complete launderability it will probably still be necessary to employ a resin stabilization treatment. Possibly a cross-linking resin can be incorporated with the modified viscose.

Eleven references to the literature are cited.

•

Dyeing Behavior of Feltmaking Fibers

Freedland, V D, *Dyer 121, 775-6, May 8, 1959*

Although the dyeing of hats presents a number of special difficulties, there has been very little publication until recently of systematic investigations into the problems encountered.

Hat dyers are particularly conscious of the differences in dyeing properties shown by wool and rabbit fur. It has long been appreciated that, when dyeing fur to a particular shade, much more dyestuff is required than for wool. Within the past ten years studies have been made, not only of the relative rates of dyeing of wool and rabbit fur in the broad sense but also of the differences which have been shown to exist in furs carrotted to different degrees and by different kinds of carrot.

Tucker found that although nearly twice as much acid dye is needed on rabbit fur to equal the shade on wool, the actual exhaustion of dye on wool at pH 2-4 is generally only slightly greater than on fur. Kramrisch reported a greater difference in exhaustion on the two fibers (68% on wool, 43-5% on fur). He used much more Glauber's salt (40%) in the dyebath, however, and the degree of carrot of his fur may have been different from Tucker's.

Royer *et al* showed by experiments on fine and course wool fibers that the diameter of a fiber affects both the rate of dyeing and the color values obtained. Since fur has about one-half the diameter of wool, the greater surface area of the finer fiber should cause it to appear lighter in shade because of a difference in the light reflectance.

Nonmercuric and mercuric carrotted furs, treated with different strengths of carrot, were used for investigations in which the influence of carrotting on subsequent dyeing was compared. Froehlich found that the more strongly the fibers are carrotted, the greater is the adsorption of dye at lower temperatures (eg, 40°C), the nonmercuric carrotted fur taking up more dye than the mercuric. At elevated temperatures the mercuric carrotted fibers have the higher uptake, while the nonmercuric carrotted fibers adsorb less dye the more strongly they are carrotted. This difference is shown even more markedly when dyeing takes place under less acid conditions. The dyeing behavior of mercury carrotted fur is much more uniform than that of the nonmercuric.

Haigh observed that the tips of mercuric carrotted fibers dyed darker than the untreated fiber shafts, while the reverse was the case with nonmercuric carrots.

The dyeing behavior of three regenerated protein fibers used in blends for hat-making (Ardil, Fibrolane and Merinova) is also referred to briefly.

Seven references to the literature are cited.

•

The Dyeing, Printing and Finishing of Zefran Acrylic Alloy Fiber

Anon, *Dyes Chem Tech Bull (du Pont) 15, 88-99, June, 1959*

"Zefran" is the registered trademark for the Dow Chemical Co's acrylic alloy fiber. Zefran has affinity for a wider class of dyes than other acrylic fibers, and has long wear, good dimensional stability and low pilling properties. It has a good white color. The physical properties include a tenacity of 3.4 gpd, 30% elongation, 2.5% moisture regain and 1-2% shrinkage in boiling water.

Instructions are given for scouring, desizing and bleaching Zefran. Hot scouring above pH 8.5 should be avoided to prevent fiber discoloration. Sodium chlorite is recommended for bleaching.

Vat dyes may be applied in a reduced dyebath or by the pad-steam process. Too much caustic and hydrosulfite may cause yellowing of the fiber.

Naphthanil (azoic) dyes are applied by a method similar to that used on cotton. An excess of caustic in the naphthol bath must be avoided. The diazotized base requires a somewhat higher temperature than on cotton to obtain complete coupling.

Sulfur dyes are used by the conventional method, except that only enough soda ash is added to give a pH of 10.

Direct dyes are applied by the usual method. An aftertreatment with "Insonite", a fixative agent, is recommeded to improve the fastness.

Capracyl (premetallized neutral-dyeing) dyes are used in the same manner as on wool. Zefran has greater affinity for these dyes than wool.

Zefran is readily dyed with cationic dyes with the addition of acetic acid, an alcohol sulfate and a nonionic surfactant. Brilliant shades are obtained, but the fastness to light and washing is usually not too good.

Disperse dyes may be applied in the normal manner. Addition of a carrier gives a 10-20% increase in strength. The fastness to light and washing, however, is poor.

Full instructions are given for applying these various classes of dyes, and tables of fastness are included.

For printing, vat dyes are recommended, applied by conventional cotton procedures.

In finishing Zefran fabrics, high temperatures and strong alkalis should be avoided to prevent discoloration.

•

Finishing Nonwoven Fabrics

Anon, *Textile World 109, 119, Mid-July, 1959*

Nonwoven fibers that are destined for other than disposable purposes can be dyed, printed, embossed and finished on ordinary dyehouse equipment.

Because nonwovens as a class do not have the tensile strength or drape associated with woven fabrics, it is necessary to process them in the open width at lower tensions than can be used on woven fabrics.

There are two broad classes of nonwovens, in which 1) the fibers are held together by an added binder, 2) the fibers are bound together by thermoplastic fibers mixed in the blend, which are plasticized by a heat treatment.

For many purposes, dyes and pigments can be added to the binders, but the amount so added is limited, since an excess may affect the binding action or the hand of the fabric.

Nonwovens made of cellulosic fibers bound with latices can be dyed by adding color in the latex emulsion, but any salt in the dye may injure the stability of the emulsion.

If the nonwoven is strong enough to withstand moderate tension, it may be dyed in jigs or becks (the latter in full-width only). For cellulosic fibers, direct, sulfur and vat dyes can be used. Mixed-fiber nonwovens that use thermoplastic fibers (eg, acetate or nylon) as a binder may require disperse or acid dyes to tint these fibers.

Dyed nonwovens may be dried in loop dryers, or any other dryer in which tensions are low.

Printing may be done on conventional printing machines, but excessive tensions must be avoided. Pigments are largely used for this purpose. Screen-printing methods may also be used.

To overcome the poor drape of nonwoven fabrics, they may be treat-

(concluded on page 77)

News of the Trade

Second Annual SOCMA Seminar

Key representatives of various Federal Government Agencies will highlight the Second Annual Seminar on Tariff and Customs Matters to be held by the Synthetic Organic Chemical Manufacturers Association on Tuesday, October 13, at the Roosevelt Hotel in New York.

Sponsored by the Customs Subcommittee of SOCMA's International Commercial Relations Committeee, with the added assistance of the Escape Clause—Antidumping Subcommittee, the Seminar is designed to broaden the understanding by the organic chemical industry of tariff and customs problems and their practical, day-to-day importance.

Following the outstanding success of last year's Seminar, SOCMA this year has expanded its format and acquired top-ranking Washington officials as speakers. Beginning at 9:15 am and lasting until 4:00 pm, the program will feature, in order, Serge N Benson, tariff advisor of the Senate Financing Committee, discussing "The Escape Clause—What did Congress Intend?"; James P Hendrick, Assistant to the Secretary of the Treasury, speaking on "American Industry and the Antidumping Act," and Paul Kaplowitz, general counsel of the US Tariff Commission, on "The Challenge of the Tariff Simplification Act."

At the noon luncheon session, the featured speaker will be D B Strubinger, assistant commissioner of customs, discussing "The Bureau of Customs—Hub of Import Control." He will be followed during the afternoon session by Walter G Roy, deputy commissioner of customs, speaking on "The Complexities of Customs Valuation," and J Edward Ely, chief of the Foreign Trade Division of the Bureau of the Census, on "The Question Marks in Import-Export Data."

Other speakers will be Fred Ebersole, chairman of the SOCMA Customs Subcommittee; H F Shattuck, chairman of the SOCMA Subcommittee on Revision of Tariff Act Schedules, and James F Donnelly, of the legal firm of Barnes, Richardson and Colburn, General Councel to the Association. A question-and-answer period will follow each subject of discussion.

Admission to the Seminar is by invitation. Further information may be obtained at the SOCMA office at 41 E 42nd St, New York 17, NY.

Drawing of new home of Carbic-Hoechst Corp, Hostachem Corp and Hostawax Co (all three now in New York) to be constructed in Mountainside, NJ.

Carbic-Hoechst and Hostachem Move to New Jersey

Intercontinental Chemical Corp, 350 Fifth Avenue, New York, NY, will build a modern building of over 40,000 square feet in Mountainside, NJ, at Sheffield Road, off Route 22. The building will be the new home for Carbic-Hoechst Corp, Hostachem Corp and Hostawax Co, techinal representatives and distributors for the products of Farbwerke Hoechst AG, West Germany, and Hoechst Chemical Corp, West Warwick, RI.

Carbic-Hoechst Corp, which sells dyestuffs, pigments and textile chemicals, will move from 451 Washington Street, New York, and will have a modern laboratory for customer's service and application research, and a complete warehouse, including refrigerated storage for fast color salts.

Hostachem Corp and Hostawax Co will relocate their sales offices for chemicals and waxes from 350 Fifth Avenue.

Executive offices of Intercontinental Chemical Corp and Hoechst Pharmaceuticals, Inc will remain at the present location, 350 Fifth Avenue, New York, while the accounting department of Intercontinental will also be moved to the new premises.

The companies will provide new positions for office and laboratory personnel when the building is completed next spring.

●

SRI Scientists Studying Breakdown of Synthetics by UV

The breakdown of synthetic textile fibers by ultraviolet light is being investigated for the Materials Laboratory, Wright Air Development Center, U S Air Force, by Southern Research Institute, Birmingham, Ala. A task force of physicists, chemists, and textile technologists, under the direction of W S Wilcox, head of the Institute's Physical Division, and C E Feazel, head of the Applied Chemistry Division, is attacking the problem.

Most previous studies on the deterioration of textile materials reportedly did not attempt to separate the effects due to radiation alone from those caused by temperature, atmosphere, and other complicating factors. Consequently, a primary object of the SRI research program is the isolation of the effects of radiation from other effects.

Synthetic textile materials, exclusively, are being studied. They include nylon, Dacron, Teflon, polyethylene, and Orlon. The synthetic textile materials are being exposed in vacuum and in inert atmospheres to ultraviolet light ranging in wavelength from 200 to 400 millimicrons. Then, the mechanism of deterioration of the materials is being studied, based on the determination of molecular weight changes, decomposition products. crosslinking, and other ultraviolet effects.

Results of the SRI study may ultimately have practical value such as in the selection or development of textiles and equipment for extreme upper atmosphere use and for space travel.

●

Lenox Chemical Co Formed

The formulation and incorporation of Lenox Chemical Co has been announced by its president, Leonard Shaftan.

The firm reportedly will manufacture chemicals for a wide number of uses in the textile industry and will offer complete sales and technical service facilities. Products will include wool lubricants, antistatic finishes and dyeing auxiliaries.

Mr Shaftan, formerly associated with L Sonneborn Sons, stated the new company would operate from plant and laboratory headquarters in Providence, RI.

National Aniline to Reduce Prices of Maleic Anhydride, Fumaric Acid

Price reductions for maleic anhydride and fumaric acid, to become effective January 1, 1960, were announced recently by Allied Chemical's National Aniline Division.

The price of maleic anhydride, in carload quantities, will be reduced to 23.5 cents per pound for rods and tablets and 22.5 cents per pound for the molten product—a 5.25-cent decrease. In less than carload amounts, the new price for maleic anhydride in rod and tablet form will be 25 cents per pound, which represents a 4.75-cent reduction.

Fumaric acid will be priced at 22.75 cents per pound, carloads, representing a 4.5-cent cut. The new price for less than carload purchases will be 24.25 cents per pound, a decrease of 4 cents. All prices are fob works, freight equalized with recognized competitive producing points.

Earlier, Allied Chemical's National Aniline Division announced construction of new fumaric acid facilities at Moundsville, W Va, to meet increased customer demands. The new facilities, to be completed by June, 1960, reportedly will double National's present fumaric acid capacity and will add to previously announced construction currently underway.

●

M & S Roll Engraving Co Bought by Atlantic Engraving Corp

M & S Roll Engraving Co, East Brookfield, Mass, is now a division of Atlantic Engraving Corp, West Warwick, R I. Edward Megarry, previously M & S owner, will be president of the division, to be located in West Warwick.

The new division manufactures Microflow applicator rolls for color, ink, plastic or adhesives, as well as embossing rolls. Atlantic Engraving Corp is an engraver of pantograph, mill and photo rolls for printing textiles.

Microflow rolls are now available in a wide range of standard and special cell constructions. The company is also equipped to grind and re-engrave worn rolls.

●

57th Annual Convention, Phi Psi

The 57th Annual Convention of Phi Psi fraternity will be held at the Hotel Roosevelt in New York, April 28, 29, and 30, 1960.

Hosts for the event will be the New York Alumni Chapter. General chairmen of the convention are Roger E Lewis, Union Carbide Chemicals Corp, and Douglas F Grady, Thorndike Deland Associates.

Kaswell

Backer

Jacobs

Brown

Kaswell Elected President of Fiber Society

Ernest R Kaswell, president of Fabric Research Laboratories, Inc, Dedham, Mass was elected president of the Fiber Society at the group's annual business meeting held Sept 10 at Princeon, NJ. He succeeds S Jack Davis, Chemstrand Corp.

Elected vice-president to succeed Kaswell was Stanley Backer, Massachusetts Institute of Technology. Re-elected to the offices of secretary and treasurer, respectively, were Julian S Jacobs and Hugh M Brown, research consultant.

The election of officers was part of the Society's two-day meeting which featured the delivery of seven technical papers, a banquet address by Helmut Wakeham on the textile industry of India, and a ceremony honoring 15 past presidents and a past secretary. A special award also was presented to Mr Jacobs for his 17-year service as editor of the *Textile Research Journal*, a post from which he retired this past spring.

Technical papers delivered included "Modification of Fibers by Grafting," by E H Immergut, Dunlop Research Center, Toronto, Canada; "The Failure of Strong Fibers Under Repeated Loading," J L Riley and T W George, Celanese Corp of America, Summit, NJ; "Fiber Lubricants," D M Cates, School of Textiles, North Carolina State College; "Heat Transmission Through Fibrous Cotton Slabs," H J Janssen and R V Bailey, Southern Regional Research Laboratories, New Orleans, La; "The Physical State of Direct Dyes in Viscose and Its Influence on Lightfastness", L Weissbein and G E Coven, American Cyanamid Co, Bound Brook, NJ,; "Dynamics of Textile Materials," D P Petterson, G M Stewart and F A O'Dell, Army Chemical Center, Md; and "Effects of Drawing and Skin-Core Ratio on Properties of Viscose Rayon Filaments," J H Dusenbury, C Dansizer and E Dey, Textile Research Institute, Princeton, NJ.

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Biggest British Textile Display in US to be Shown in '60

The biggest and most complete display of the British textile industry ever shown in the United States will be part of a 17-day British exhibition of industry, technology, science and culture in the New York Coliseum next June 10 to 26. The Federation of British Industries is sponsoring the event with the backing and support of the British Government.

D A Lamb, general manager of the exhibition, said the textile industry will have one of the most extensive displays with leading firms in the fields showing their finest wool, cotton, linen and other fabric lines.

●

3rd Philadelphia Conference of the Graphic Arts Industry

At the August meeting of the Executive Committee, Technical Association of the Pulp and Paper Industry, Delaware Valley Section, it was decided to hold the 1960 Conference of the Graphic Arts Industry on March 26, 1960, in the Benjamin Franklin Hotel, Philadelphia, Pa.

Frederic Dannerth, who has for many years acted as technical advisor to the industry, was appointed general chairman of the Conference.

Plans are being made to celebrate the 270th anniversary of the first paper mill in America, which was established in Germantown, Pa in the year 1690 by Wilhelm Rittenhaus. This event will also mark the 275th anniversary of the first printing shop in the Middle Colonies, which was established in Philadelphia in 1685 by William Bradford, one of the early settlers who came over from Leicestershire, England.

Arrangements are being made for an attendance of 1000 persons, including leaders in the textile, rubber, paint, varnish and plastics industries.

Persons desiring to be placed on the mailing list for the Conference and Exhibition, may write to Dr Dannerth at 625 Crescent Ave, Glenside, Pa.

Brown & Edinger Textile Consultants Appoint Metcalf Agency

Appointment of George T Metcalf Company, Providence, RI, as advertising and public relations counsel has been announced by Brown & Edinger Associates, consultants to management of dyeing, printing and finishing plants.

Scope of the Brown & Edinger service is industry-wide as the principals—Frederick G Brown and McDonald L Edinger—are specialists in all phases of dyeing, printing and finishing. Both were formerly associated with the Apponaug Company, of which Mr Brown was president and Mr Edinger was production manager. B & E personnel operate from the firm's headquarters at Warwick, RI.

Activities include counseling on such technical and mechanical problems as improvement of product quality and application of new processes and methods, along with emergency trouble-shooting.

Past experience of Messrs Brown and Edinger reportedly includes participation in introduction to the U S A of the first successful crease-resisting process, which is basic to practically all contemporary "wash-and-wear" fabric finishing. Among other enterprises, they have pioneered in the production of durable embossed fabrics, in permanent finishes, in continuous dyeing under the Standfast Molten Metal Process, and in the use of gravure engraving on regular printing machines.

Selection of the Metcalf agency, according to Brown & Edinger, was dictated by the Providence company's long experience with promotion of textiles and related products and services. Account supervisor is Walter C Hyland, president of George T Metcalf Co.

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ASQC Textile Division Planning Varied Program for 10th Conference

The Textile Division of the American Society for Quality Control will hold its 10th Annual Conference at The Clemson House, Clemson, SC, February 18-19, 1960. Robert G Mitchell, International Latex Corp, Dover, Del, chairman of the Textile Division, announced that the Society is planning a more varied program for its 10th Anniversary, with items of interest to additional segments of the textile industry. The program will give added emphasis to discussion groups on practical process control, as well as educational and technical quality control papers.

Bidlack

Feild

Sun Chemical Acquires Pennsylvania Color and Chemical Co

As part of its expansion program, Sun Chemical Corp has purchased all the stock of Pennsylvania Color & Chemical Co, Inc, Doylestown, Pa, a leading manufacturer of pigment dispersions.

Pennsylvania Color, with sales reported to be in excess of $1,000,000 annually, is one of the leading manufacturers of pigments dispersed in solid form and in various vehicles which are used extensively in the manufacture of inks for fine color printing and numerous other applications.

It will be operated as one of Sun's autonomous divisions under its present management, V C Bidlack and J M Feild. It becomes part of Sun's Chemical Group, which includes Ansbacher-Siegle, a leading manufacturer of dry pigments: Warwick Chemical, producer of textile resins; and Electro Technical Products, which makes electrical insulation materials, special coatings and plastics. Sun is also a manufacturer of printing inks, paint and finishes.

o

Openings at Natick QM R&E Center Labs

Vacancies for the posts of assistant to the research director and assistant for applications engineering, both at $11,595 p/a, have been announced by the Chemicals and Plastics Div, Quartermaster Research and Engineering Center Laboratories, U S Army, Natick, Mass.

For the post of assistant to the research director, U S citizenship, a doctorate plus three years of professional experience are required. Resumes should be forwarded to George R Thomas at Natick before October 31.

A BS, U S citizenship, and three years of professional experience are required for the applications engineering post. Sandard Form 57, which can be obtained at any first class post office or Government installation, should be forwarded to Henry R Rose, civilian personnel officer at Natick, before October 31.

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Eight Scientific Session, ITS

Leading textile technologists representing Canada and the United States gathered at the National Research Council, Ottawa, Canada on Sept 17 as delegates to the eighth scientific session of the Institute of Textile Science.

The meeting featured papers covering the latest textile technological advances concerning weathering, the application of X-Rays in fiber investigation, dye behavior, and man-made fiber testing.

In one address, Colin H Bayley, principal research officer in charge of the Council's Textile Research Section, and a past president of the Institute of Textile Science, drew attention to the rapidity with which outdoor weathering caused fabrics to lose their fungicides.

He said that one of these fungicides, copper carbonate, as used in cotton fabrics lost its properties when alternately wetted and dried. And if the treated fabric had first been exposed to light rich in ultra violet rays (such as strong sunlight) then the copper became still more susceptible to removal by water.

Textile technologists were now devising methods to combat these and similar problems, said Mr Bayley.

Other speakers were: H A Kraessig, Industrial Cellulose Research Ltd, Hawkesbury, Ont, on "Some Applications of X-Rays to Fiber Investigation"; M T Schuler, of E I duPont de Nemours & Co, Inc, on "Dye Affinity of Polyester Fiber"; and J A Pinder, Canadian Industries Ltd, Kingston, Ont, on "The Bulking Properties of Fibrefill".

On September 18, the National Research Council hosted a joint visit from the Ontario and Quebec Sections of the Canadian Association of Textile Colourists and Chemists. CATCC members made morning and afternoon tours of the Council's various research laboratories.

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Du Pont Fiber Objectives for 60's Disclosed

Production, research and marketing objectives of Du Pont's Textile Fibers Department for the coming decade were previewed by representatives of the textile industry on September 14 at New York's Hotel Plaza.

The challenge facing the textile industry over the next 10 years, according to Ford B Draper, general director of Du Pont's Textile Fibers sales, includes meeting the clothing needs

of 50 percent more young adults and a 20 percent all-ages population increase, and diversifying wardrobes and home furnishings to accommodate heightened living standards and more leisure time of the average American family.

Andrew E Buchanan Jr, general manager of the department, recalled that Du Pont was well established in the rayon and acetate fiber business in 1939, when the company announced commercialization of nylon. In the 20 years that followed, Orlon acrylic and Dacron polyester fibers were introduced and Du Pont's capacity to produce these three new fibers has expanded to nearly 600 million pounds per year.

But, he added, expansion in kind alone will be inadequate for tomorrow's markets. Substantial research efforts are being intensified to meet the demand for new and improved fiber products. He predicted for the "not too distant future" such advances as elastomer fiber yarns, variants of present polymers with unique performance characteristics, better and more economic dyeing and finishing techniques, and new methods for providing greater latitude in fabric aesthetics and textures.

Citing some of the industry-wide merchandising concepts developed by Du Pont in "the proving grounds of the 50's"--"wash-and-wear," the sweatered look, men's midweight clothing, and the "hint of a tint" in hosiery—Ellwood F Altmaier, advertising and promotion manager for Du Pont fibers, explained that this assistance to the textile industry will continue, and that a new dimension in communications will be added.

Two years of intensive consumer research into the "motivators in buying" disclosed the very human need for self-confidence in the right dress and the satisfaction in an attractive home, the advertising executive stated.

The commercials of Du Pont's new weekly television series—"The Du Pont Show With June Allyson"—will attempt to show how the qualities in Du Pont fibers contribute to the self-confidence of the wearer in realistic social and business situations. Subjects to be covered in these commercials will include men's, women's, and children's wear, home furnishings, carpets, and nylon tire cord.

•

Scalamandre Museum Exhibiting 18th Century English Textiles

The Scalamandre Museum of Textiles, 57 E 57th St, New York 22, NY, has assembled a beautiful exhibition of English 18th Century textiles for the autumn months. The period is known as the "Golden Age" of English decorative art.

The exhibit is comprised of the various types of textiles, both woven and printed, that were used for the furnishings of the English 18th century homes. Those of the early part of the century are portrayed in the rich colorings of the Queen Anne and Early Georgian period when the designs were large scaled and symmetrical. They are followed by the Mid & Late Georgian periods when the designs were reduced in scale and the colors softened during the Neo-Classic Revival.

The exhibition is not only handsome, but is likewise educational. It is assembled for the benefit of research workers, interior decorators, students of design and the general public.

Lectures to schools, clubs and visiting groups are given upon request. Arrangements for either day or evening lectures can be made upon request. Arrangements for either day or evening lectures can be made by contacting John Kent Tilton, Director of the Scalamandre Museum of Textiles.

The museum is open from 9:00 AM to 5:00 PM, Mondays through Fridays, and is free to the public.

• NEW PRODUCTS AND DEVELOPMENTS •

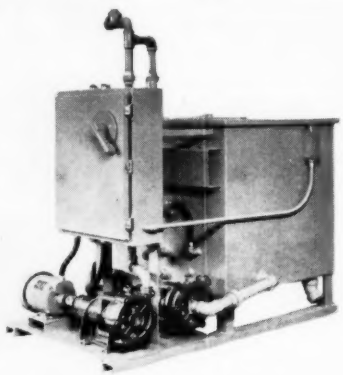
Interchem Polydye Colors

For dyeing polyester fibers, the Color & Chemicals Division, Interchemical Corp, Hawthorne, NJ, has introduced a new series of highly dispersed dyes known as Interchem Polydye Colors. These new colors are said to be equally satisfactory for application by carrier-dyeing techniques or by high-temperature methods in becks, jigs or pressure equipment.

Interchem Polydye Colors reportedly provide a wide range of shades, from pastels to full, deep shades, of excellent fastness. They are said to have good exhaustion, pile on, and leveling properties, and can be applied to raw stock, tow, yarn, and woven and knitted fabrics.

Selected Polydye Colors are reported suitable also for dyeing certain other synthetics, such as acetate, triacetate, polyamide and acrylic fibers.

Now available in the Interchem Polydye Series are several blues, a yellow, scarlet, burnt orange and violet. Other Polydye Colors are in the development stage and will be released soon, it is reported.



Electronic Solution Controller

Electronic Solution Controller

An automatic electronic solution controller system has been developed by the Electro Mechanisms Corp, Skokie, Ill, for controlling concentration of caustic, acidic or aqueous solutions.

The controller reportedly can be used with either continuous or batch-type textile bath equipment, or any application where precise concentrate levels must be maintained.

Complete system consists of: 1) a concentrate-level-setting control; 2) a sensing electrode which measures *change* in concentration: 3) a magnetic amplifier which utilizes output of sensing electrode to control operation of 4) a pump assembly, which delivers concentrated solution to 5) a wash tank; 6) a combination compound and concentrate holding tank.

In operation, whenever the level of the concentrated solution in the holding tank falls below a preset point, the pump is automatically actuated and sprays a wash solution on the dry compound (or liquid concentrate) until the wash tank concentrate is again at the desired concentration level. The system is completely automatic since the wash tank solution is continuously circulated through the sensing electrode, and any variation in electrode output actuates the self-balancing control.

The equipment is manufactured to NEMA and JIC specifications, and reportedly withstands rugged use in industrial plants. Typical advantages cited over manual control: consistent product quality, elimination of periodic sampling of solutions, and safety against operating hazards.

YARMOR PINE OIL—LEADING WETTING AGENT FOR TEXTILES

The value of pine oil in wet-processing as a penetrant and wetting agent is long established. However, perhaps you're not acquainted with the particular advantages of Yarmor 302W, a Hercules pine oil made specifically for the textile industry. Yarmor reagent is not just "pine oil"; it is specially processed to produce an extra high-grade product with the greatest wetting, penetrating and emulsifying ability. That's why so many people in the textile industry never just say "pine oil." They say Yarmor®.

Pine Chemicals Division
Naval Stores Department

HERCULES POWDER COMPANY
INCORPORATED

900 Market Street, Wilmington 99, Delaware

NY59-1

Arnold, Hoffman Recapitulates Procion Range

Prompted by inquiries regarding the extent of the shade range capable of being produced with fiber-reactive dyes, Arnold, Hoffman & Co, Inc has listed its present line of Procion dyestuffs, noting that, since the introduction in 1956 of the first three members of this new class, the range has been increased to twenty-six. Now available are: Procion Yellows RS and HAS; Brilliant Yellows 6GS and H5GS; Brilliant Oranges GS and HGRS; Brilliant Reds 2BS, 5BS, H7BS and H3BS; Red GS; Rubines H2BS and BS; Scarlets H3GS and GS; Violet H2RS; Turquoise HGS; Blues 3GS and HBS; Brilliant Blues RS, H7GS and HGRS; Printing Greens B and 5G; Black HGS; and, most recently, Procion Orange Brown HGS.

About one-half of these, designated by "H", are recommended by the manufacturer for hot-dyeing processes while the others can be applied by cold-dyeing techniques peculiar to fiber-reactive dyes.

A popular misconception concerning fiber-reactive dyes, Arnold, Hoffman notes, is that they are restricted in use to deep, brilliant shades. Currently available pamphlets illustrate that the Procion fiber-reactives may be used to produce a wide range of shades ranging in depth from the palest to deep, full shades and covering nearly every part of the spectrum.

These pamphlets may be obtained from Arnold, Hoffman & Co, Inc, Providence, RI.

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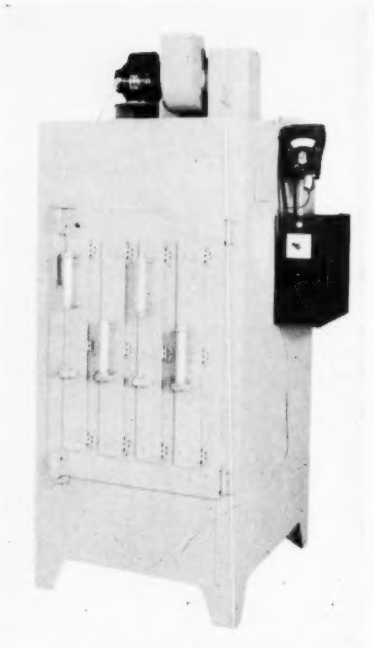
Mount Hope Selvage Uncurler

In an effort to meet the problem of cost in handling turned selvages manually, Mount Hope Machinery Co, Taunton, Mass, has come up with the Mount Hope Selvage Uncurler, a relatively low-cost instrument which, it is claimed, eliminates the need to put extra men on the selvage-straightening operation; prevents cost of machine stoppages, slow-downs, and delays; cuts spoilage; and increases quality and output.

The Mount Hope Selvage Uncurler reportedly can be used with any type or weight of fabric, and in any direction of cloth travel—vertical, horizontal or angular. It is said to be easy to install, adaptable to any processing stage, self-powered (by the cloth itself) and with complete automatic tension control. A bulletin explaining this selvage uncurler is available from Mount Hope Machinery Co on request.



Despatch Textile Testing Oven

Despatch Textile Testing Oven

An oven for testing resin and ink drying on cloth samples, and also for testing thread and cloth samples where many drying applications are involved, has been developed by the Despatch Oven Co, Minneapolis, Minn.

Special racks are provided for pin frames and the door contains four individual doors for loading of single pin frame racks. This reportedly allows maximum drying efficiency of all samples in the oven and flexibility of drying schedules to the operator.

The textile testing oven has maximum temperature of 450°F. It is electrically heated, has temperature indicating controller and a convection heating system which is said to provide accurate heat control throughout the work chamber. This excellent heat uniformity and temperature controller assures reliable test data, it is claimed by the maker. The work chamber dimensions: 24″ wide, 24″ deep, 36″ high. The oven lists at $820.00.

For complete specifications write Despatch Oven Co, 611 SE 8th Street, Minneapolis, Minn. Ask for bulletin 203-7.

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Sulfur Tetrafluoride

A unique chemical compound, whose very existence was doubted in scientific circles until recently, was placed on the market recently in development quantities by the Du Pont Company's Dyes and Chemicals Division.

The new product, sulfur tetrafluoride, is a reactive gas which, unlike other reagents, reportedly possesses the unusual ability of replacing oxygen with fluorine in many chemical compounds. In light of the widespread interest in fluorinated products in recent years, this "unusual ability" is believed to be particularly significant since it will lead to a large number of fluorinated compounds heretofore unavailable.

The new chemistry of sulfur tetrafluoride is credited in large measure to three research chemists, Earl L Muetterties, William Channing Smith, and Charles W Tullock—all members of Du Pont's Central Research Department.

Although sulfur tetrafluoride appears to be of particular interest in pharmaceutical products, other uses of the fluorinating agent might be in production of improved weather-resistant finishes, and oils, films, plastics, and elastomers with high thermal stability and resistance to oxidation. The low surface energy characteristic of many fluorinated compounds also suggests use of sulfur tetrafluoride in manufacture of surface-active agents, water and oil repellents, and lubricants.

While much remains to be learned about the chemistry of the compound, Du Pont chemists said their studies show sulfur tetrafluoride can be reacted effectively with a variety of carboxylic acids and carbonyl compounds, including aldehydes, ketones, and quinones to produce new fluorine-containing products or greatly simplify the manufacturing processes involved in existing products.

•

Neutro-Stat

The Simco Co, Lansdale, Pa, has introduced a new antistatic aerosol spray in a 16-oz can. Known as Neutro-Stat, the new product is said to be non-oily, nongreasy, and nonflammable and to dry almost instantaneously. It is said to neutralize and prevent the formation of static charges, thereby preventing attraction of dust, electrostatic shocks, and the clinging together of various materials.

Neutro-Stat is also available in bulk as a liquid concentrate to which water or alcohol is added to make a ready-to-use solution for dipping, wiping or spraying, for use in rinse waters, conditioning baths, etc.

The 16-oz can costs $2.75. A carton of 12 cans costs $27.50. Bulk prices and other information may be obtained from Simco.

Plexene XX

Plexene XX, an aqueous solution of an organic sequestering agent for chelating ferric iron through a pH range of 3-14, is said to be proving effective in chelating calcium, magnesium, copper and other di- and trivalent metals, and will selectively chelate iron in alkaline solutions before calcium.

Plexene XX, a product of Tanatex Chemical Corp, Kearny, NJ, has found application in the textile industry in dyeing, printing, scouring and finishing. It has a peptizing effect on oil, wax, gum, heavy soil deposits, grease and carbon. Other applications call for its use to stabilize latices, in emulsion polymerization to stabilize particle size, and to prevent coagulation.

Plexene XX is also manufactured in Europe by Tanatex Chemical (Holland) NV.

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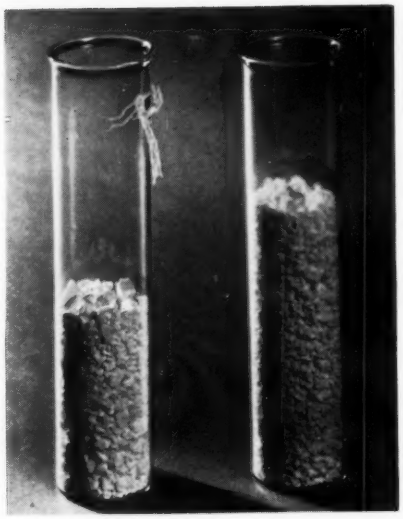
Kofural Impreg

A chemical-resistant material, called "Kofural" impreg, which can be used in the fabrication of certain kinds of processing equipment, has been announced by Koppers Company, Inc. The material is a lumber base, impregnated with a monomeric solution of furfuryl alcohol and a catalyst. It can be supplied in special fabricated shapes or in the usual lumber forms, for fabrication with standard wood-working tools.

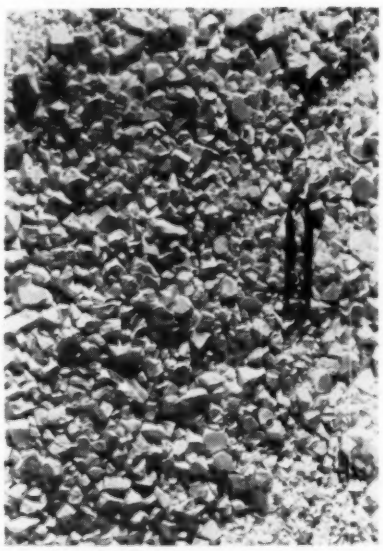
According to the manufacturer, the vacuum-pressure treatment, which incorporates the resin with the wood, utilizes the small molecular size of the resin to obtain complete penetration of the wood structure, including the cell walls. After polymerization to a thermoset resin, it is immune to electrolytic or galvanic corrosion. The resultant product is resistant to acid and alkali attack and is expected to find use in filter press plates, frames, filter leaves and grinds, flumes and ducts, tanks, trays and boxes.

Besides its chemical properties, "Kofural" impreg reportedly exhibits greater hardness, crushing strength and dimensional stability than untreated wood. It is not recommended for extended service exposure to wet and dry chlorine gas or related bleaching compounds, or to chromic or nitric acid or hot, concentrated sulfuric acid.

A bulletin describing the properties and availability of Kofural impreg can be obtained from the Koppers Company, Inc, Wood Preserving Division, 719 Koppers Building, Pittsburgh 19, Pa.



Two test tubes, each containing a 30-oz sample of starch, show same amount of high-density Globe Brand Easy-Flow starch (left) and conventional textile starch (right).



Slightly magnified closeup of Globe Brand Easy-Flow textile starch shows even appearance. Paper clip shows relative particle size of random sample of new starch form.

Globe Brand Easy-Flow #3366

A new high-density starch in granule form has been developed for the textile industry by Corn Products Co, 17 Battery Place, New York 4, NY. Designated Globe Brand Easy-Flow #3366, the new form of starch, according to Corn Products, offers five new basic advantages: 1) it is 40% more dense; 2) more uniform in particle size, moisture content and pH; 3) easier to handle in bags and to convey in bulk; 4) unequalled in wetting and dispersing performance; 5) cooks faster and more uniformly to produce a superior size.

The granules are shipped in bulk or in new, smaller 100-lb bags. The higher density of the starch is said to reduce record keeping, handling costs, and cut the number of deliveries because it expands present storage facilities by 40%.

The new densified starch granules are said to be uniform in size, moisture content and pH. Each of these qualities is closely controlled during manufacture to assure a more uniform starch product. The results, says Corn Products, manifest themselves in faster paste mixing and in superior sizing characteristics.

It is claimed that the maximum dry-flow characteristics of Easy-Flow speed and facilitate in-plant or between-plant handling, whether in bags or bulk. It is said to resist bridging or caking and to be more easily conveyed and dumped from hoppers. The new form of starch reportedly has high resistance to abrasion and is claimed to be far less fragile than existing textile starches.

The controlled particle size and uniform granule density of Easy-Flow reportedly assures a more even dispersion in either warm or cold water.

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C-Tron

Crown Chemical Corp's answer to textile finishers' formaldehyde odor problems is C-Tron, a new low-formaldehyde thermosetting resin. According to Crown, the new resin's low-free formaldehyde content has made it possible for some finishers to eliminate the afterwash process.

C-Tron reportedly imparts a high quality crease and shrink resistance to both natural and synthetic fabrics.

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Maniflex 500

Maniflex 500, a new latex backing introduced by Manufacturers Chemicals Co, Inc, is said to give exceptional dimensional stability, virtually eliminating shrinkage and stretch, and to prevent revelling of knit goods due to cutting and handling.

The new clear latex film reportedly cures at low temperatures, can be applied by roller or spray, and is nontoxic and nonflammable. The film is said to be resistant to both laundering and drycleaning.

It is suggested by the manufacturer that the latex be applied at the rate of ¾ to one ounce per linear yard of 54"-wide knit goods.

Complete information, samples and prices are available from Manufacturers Chemicals Company, Inc, 930 North Darien St, Philadelphia 23, Pa.

Low-turbidity Tetrapotassium Pyrophosphate

Monsanto Chemical Company's Inorganic Chemicals Division has announced a new low-turbidity tetrapotassium pyrophosphate which is said to make it possible for manufacturers of general purpose liquid detergents to formulate clear, cloudless products for retail and industrial uses.

This high-assay tetrapotassium pyrophosphate assures manufacturers of liquid detergents a minimum of potassium tripolyphosphate and other trace impurities which cause unsightly cloudiness in finished products, Monsanto states.

Commercial quantities are now available. Further information can be obtained by writing to Monsanto's Inorganic Chemicals Division, 800 N Lindbergh Blvd, St Louis 66, Mo.

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Sumstar

A new chemical product which could have far-reaching application in the textile industry will soon be available in semicommercial quantities from Miles Chemical Co, Elkhart, Ind.

The product, dialdehyde starch being marketed under the name Sumstar, is currently being evaluated for a variety of industrial applications with particular emphasis on the role it might play in the textile industry.

Originally developed by the United States Department of Agriculture's Northern Research and Development Division, the process has been refined and adapted for manufacture by Miles through an extensive independent research program.

John Mirza, director of chemical research and development at Miles Chemical, states that investigations have revealed that use of Sumstar should provide resistance to both shrinkage and creasing by serving as a cotton cellulose crosslinker. It may also improve abrasion resistance and tensile strength, increasing durability.

Finishes utilizing Sumstar in place of conventional or modified starches should be more resistant to laundering, it is claimed, since Sumstar will form chemical bonds with the cellulose and other fibers. In addition, lack of odor in Sumstar is said to overcome some of the problems inherent in the use of other aldehydes.

Dr Mirza suggests that Sumstar be investigated as a combination sizing agent and crosslinker, eliminating the need to wash out sizings after fabrics are woven.

In combination with ordinary starch or cellulose esters, the qualities of Sumstar as a film-former reportedly suggest its capacity to affix a greater amount of clays, pigments, and other auxiliaries to cotton goods.

Dr Mirza notes that certain derivatives of Sumstar, such as urea and melamine adducts, may also be useful additives for the textile industry.

Plans for bringing the product from its current pilot-plant operations to semicommercial production have been outlined by L D Williams, sales manager, Sumner products. He said that a new semicommercial plant with a capacity of several hundred thousand pounds a year will be on stream this month. Provisions are also being made for rapid expansions as needed.

Mr Williams said that interest in the new product for the textile industry is encouraging. Working samples have gone out to the field where the performance of the product is being evaluated.

At this time, pilot samples up to five pounds are available at no charge. Larges pilot quantities are available at $1.50 a pound.

When the new plant is on stream, prices reportedly will be reduced to $1.25 a pound for 100 pound drums and $1.00 a pound for 1000 pounds and up.

Mr Williams stated that Miles Chemical long-range plans for Sumstar point to a multimillion-pound plant producing material to sell for 30 to 40 cents a pound with even further price reductions possible.

Three types are being offered: Sumstar-S (over 90 percent oxidized), Sumstar-R (75 to 80 percent oxidized), and Sumstar-J (50 percent oxidized). Special tailoring to fit specific applications reportedly can be arranged.

Sumstar is described as a fine powder, almost colorless, nonvolatile, odorless, and of extremely low acute toxicity.

•

P-61

Another approach towards giving fabrics lifelong immunity to textile-destroying insects has been reported by the University of California at Los Angeles.

Roy J Pence, a UCLA entomologist, reports "a colorless, odorless, harmless (to humans) compound with which fabrics can be impregnated during the dyeing process".

It is claimed that the compound is fixed permanently in each individual fiber of the fabric and renders the material "indigestible" to carpet beetles, clothes moths, etc for the lifetime of the fabric. Or it can be applied in an aqueous solution to existing fabrics in the home.

The compound is said to be one of a group of substances known as antimetabolites. The antimetabolite principal is based upon compounds structurally similar to essential nutrients, such as vitamins. Very slight differences in chemical structure reportedly are just enough to cause them to be misfit links in the insect's metabolic chain. After the young insect ingests the vitamin "look-alike", it alledgedly prevents him from utilizing the essential nutrient. As a result a sort of bug beri-beri sets in, causing the insect to die of nutritional deficiency.

However, it is claimed, the mature insect recognizes the antimetabolite after the first or second "mouthful" and will leave impregnated material for "greener pastures" before any real damage is done. Thus, in effect, the fabric becomes immune to insect attack.

Clue to the new approach was Pence's finding of insects' vital need for the vitamin B complex. It is stated that unsoiled textile will not normally furnish enough nutrition to sustain fabric-eating insects. But spilled beer or carpet soiling by a not-yet-housebroken pet, perspiration and skin sebaceous secretion on clothing, or simple contamination by air-borne bacteria, which synthesize vitamin B, reportedly furnish the necessary nutrients for the insects. Antimetabolites applied over these "stains" will neutralize the nutritional content and stave off insect attack, it is claimed.

Pence's antimetabolite compounds reportedly are based upon a chemical "look-alike" of niacin, which to the insect is apparently the most vital substance of the vitamin B complex. Laboratory studies are said to have demonstrated that without this substance the insect cannot survive.

The UCLA entomologist has labeled one of his compounds P-61 (after a page numer in his original manuscript reporting on his work). A graphic demonstration of the compound's effectiveness involved a recent laboratory experiment. The figure P-61 was outlined in masking tape on a slightly soiled fabric sample. The antimetabolite was then applied to the sample. After the masking tape was removed, carpet bettle larvae were turned loose on the sample. The insects reportedly ate only where the masking tape had protected the cloth from the antimetabolite application. The figure P-61 is said to have appeared in the fabric as if it had been cut out by scissors.

Use of antimetabolites in insect control is a new approach and field studies are now under consideration.

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Are you pad dyeing synthetics with dispersed pigment colors? Use Superclear in the pad liquor. It eliminates shading from selvedge to selvedge. And there's no tailing off of shades when Superclear is present in the pad liquor. In vat-acid continuous dyeing, use Superclear with the pad liquor for level shades with any mixture of vat dyes. Superclear prevents migration of the pigment; assures uniform shades from end to end. For pad-steam continuous vat dyeing, absolutely uniform pigmentation is obtained by adding Superclear to the pad liquor. A full range of level shades is obtained, from pastels to deep tones, plus excellent fixation without migration of pigment.

LOMAR PW is recommended as a successful suspending agent. For those who add wetting agents in these operations, we have a full line to offer. Contact Jacques Wolf today for your sample and complete information.

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Chemicals PASSAIC, N.J.

Plants in: Clifton, N.J., Carlstadt, N.J., Los Angeles, Calif.

Improved Reel for Winding Yard Goods

Acme Cloth Reel Co, Greenville, SC, a major producer of reels on which textile finishers wind yard goods for retail stores, has introduced an improved product, which is said to embody greater strength, speed production, and cut labor costs.

The new reels are seamless and are made of laminated, corrugated cardboard flats bound together with Kraft paper and a special adhesive.

The additional strength and rigidity is especially effective in winding Sanforized fabrics which must be wound much tighter than ordinary goods, ACRC officials state.

The new reel is said to have virtually the same thickness on the ends as in the center, thus eliminating a tendency of fabrics to "bunch" toward the middle and making all of the material usable. It is suggested that this increases the profit from each bolt of material.

The reel's greater strength is said to allow one operation to be eliminated in winding after current machines are altered, eliminating two movements heretofore required of the operator.

It is claimed that greater net profit is promised because the reels hold up better and cost less, while winding smoother and faster.

Acme also provides a complete packaging service, including the designing and printing of matched sets of hang tags, bands, wrappers and end labels.

•

Liquid-Solids Blender

Recognizing a total of nine claims made in application, the United States Patent Office has awarded the Patterson-Kelley Co, Inc, East Stroudsburg, Pa, a patent for its Liquid-Solids® blender.

USP 2,890,027 relates the blender specifically "to improvements in machines designed to wet or moisten dry powdered materials such as are normally considered to be immiscible because of their tendencies to ball up and 'lump' when coming in contact with small streams or droplets of liquids."

Basically, the patented blender consists of two cylinders cut at right angles and joined to form a V-shaped design. This fundamental Twin-Shell mixing principle reportedly produces a combined tumbling or rolling action with a simultaneous transverse movement within the entire mass of material, plus a folding action created by the dividing of the mass during rotation. The blender is charged from either of two openings at the ends of the "V" and discharged freely through an opening at the apex of the blender.

To introduce liquids to solids, a hollow cylindrical bar mounted across the blender axis and equipped with precision machined distributing discs, revolves inside the shell to provide controlled liquid dispersion, ranging from a coarse spray for granulations to an extremely fine "fog" or mist for lump-free formulations. Liquids may be gravity-fed or pumped.

The liquid feed bar also is equipped with specially-designed agitator blades which, when the bar is rotated at the required speed to centrifugally disperse the liquid, "cavitates" the body of dry materials and maintains it in a locally churned and fluffed-up condition. Approximately 25 different versions of the feed bar assembly have been designed to meet variable blending formulations in the process industries.

Presently, Liquid-Solids blenders manufactured by the company range in size from one-quart to units of 800 cubic feet or more, and are constructed of clear plastic (laboratory models usually used for research), stainless steel, or coated and uncoated carbon steel for large units.

Some of the objectives of the blender, as stated in the patent, are "to provide an improved form of blending mill adapted to uniformly blend relatively small amounts of liquids into dry material . . . normally nonreceptive to moistening or wetting treatments . . . without the use of complicated or expensive accessory equipment."

The patent was granted to John J Fischer, assignor to Patterson-Kelley and chief engineer of the company's Process Equipment Division.

•

Catacrest 100

Crest Chemical Corp, 225 Emmet St, Newark 5, NJ, has developed Catacrest 100, which it describes as a 100%-active substantive cationic softener. It is stated that this product, an amber-colored liquid containing no solvents or diluents, disperses readily in cold water, giving low-foaming solutions. Crest Chemical suggests that, because Catacrest 100 is 100%-active, it is unnecessary to stock large amounts of softener and there is no need to prepare stock solutions. It is claimed that the product may be used with acids and alkalis and is compatible with all types of finishes, resins, catalysts and fixatives.

Catacrest 100 is said to impart a soft hand to cotton, rayon, acetate and synthetics. Crest Chemical claims that the product may be used with urea-formaldehyde, melamine and cylic resins to obtain a durably soft, lofty hand with maximum draping qualities. It is further claimed that this softener is applied to whites with no yellowing and shows excellent scorch resistance, has no effect on shade of pastel-dyed goods, preserves maximum lightfastness, and shows no chlorine retention.

Catacrest 100 is said to be substantive in long bath and is used in quantities of approximately 0.25 to 0.5 percent on the weight of fabric to obtain desired results.

•

Mitin Being Used in Scotch-Nap Sweaters, Hushalon Wool Felt Wall Covering

The protection of Mitin mothproofing has been added to Old Colony Knitting Mills' line of Scotch-Nap all-wool sweaters and American Felt Company's Hushalon wool felt wall covering.

Old Colony presently uses Mitin, a product of Geigy Dyestuffs, to mothproof its line of Fluffty sweaters, which contain a blend of fine lambs wool and imported angora.

According to Joseph Greenfield, Old Colony executive, the permanent mothproofing of Old Colony sweaters insures against costly insect damage during storage and lay-away periods and enables retailers to stock them in quantities their traffic demands. A Mitin tag is included on the two lines. Retail prices on the lines range from $5.00 to $13.95.

Hushalon, which is distributed by Central Felt and Fabric Corp and Continental Felt Co, was developed by American Felt Co to meet all technical requirements for wall coverings. A reinforced backing permits installation by usual methods. Hushalon is said to be flameproof, soil-resistant and colorfast. It is available in a wide range of solid colors which may be used plain or for custom printing.

Introduced into the dyeing process, Mitin penetrates into the fibers. It is claimed that total protection against wool-eating moths and beetle larvae is rendered the fabric, regardless of the number of drycleanings or washings. The product is said to be odorless and nontoxic in contact with the skin, and does not affect the feel of the fabric.

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SEYCO

TO Manufacturers of Dyestuffs, Textile Chemicals, Wet Processing Machinery, Laboratory Equipment, and Incidentals for the Wet Processing Plant:

The Twenty-fourth
ANNUAL PROCESSING REVIEW NUMBER

will appear on December 14th, 1959. You are cordially invited to submit information concerning your new products that have been placed on the market since November, 1958.

How to submit information:

Please list your products alphabetically, compiling each catagory (ie, chemicals, dyestuffs, etc) separately. Information should include the trade name of the product and a BRIEF summary of its uses and properties. The information should be typed, double-spaced, on 8½ x 11 sheets of paper. If illustrations are necessary, glossy photos or black ink drawings should be furnished. If the trade name is registered or the product is patented, please so note.

In order to insure your new products being listed in our issue of December 14th, information concerning them should be in our office no later than November 16th.

It is important that you list ONLY THOSE PRODUCTS WHICH HAVE BEEN BROUGHT OUT SINCE NOVEMBER, 1958.

AMERICAN DYESTUFF REPORTER
44 East 23rd St, New York 10, N Y

• NAMES IN THE NEWS •

Bouroff

Peter P Bouroff has been appointed assistant to *F O Robitschek*, president of Onyx Oil & Chemical Co, Jersey City, NJ. In addition, he will serve as plant manager for Onyx's Jersey City and Staten Island, NY, plants.

Dr Bouroff was formerly manager of the Chemical Divisions of E F Drew & Co, Boonton, NJ.

•

Allen E Martin has joined the Dewey and Almy Chemical Division, W R Grace & Co, Cambridge, Mass, as group leader for latex and rubber applications in the Organic Chemical Research Laboratory.

Martin was formerly with General Latex and Chemical Corp, Cambridge, Mass.

McFarlane

John M McFarlane has been appointed a sales and technical representative for W F Fancourt Co, Philadelphia, Pa.

Mr McFarlane will assist *Robert Rhodes*, who recently was made assistant secretary and director of the Company, in jointly covering the Middle Atlantic and Northeastern states.

•

R L Hawkins has joined the Technical Laboratories of Colton Chemical Co, Cleveland, O, a division of Air Reduction Co, Inc. He will handle technical service for polyvinyl alcohol.

Before joining Colton, Mr Hawkins was with Southern Adhesives Corp.

Richkus

Appointment of *Charles P Richkus* as Southern technical sales representative has been announced by Berkshire Color & Chemical Co, Delawanna, NJ.

Mr Richkus was formerly superintendent of dyeing for Carolina Yarn Processors.

•

Ciba Co Inc has named *Ernst A Wolff* technical manager of the expanding Chemical Specialties Div.

Dr Wolff, who has had wide experience in the general chemical and textile field, was formerly with the Bauer & Black Division of The Kendall Company where for eight years he had been group leader of industrial product research.

Martin

Hawkins

Wolff

First from BALTIMORE

In 1784, in BALTIMORE,
EDWARD WARREN
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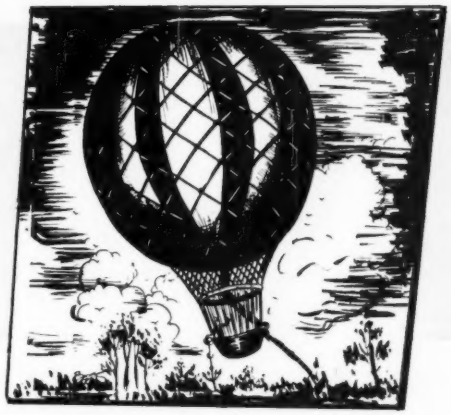
BALLOON ASCENSION...
probably from the vicinity of the Washington Monument.



Courtesy – The Baltimore News-Post

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One advantage is quality. Another is service. Wyandotte makes several grades of soda ash, all testing 58% sodium oxide or better. And Wyandotte's technically trained representatives have broad experience in the proper handling, storage, and use of soda ash. They're at *your* service anytime – to show you how you can best apply Wyandotte Soda Ash to your process, and to help you select the right grade for your needs. Call on us.

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Pacing Progress with Creative Chemistry

Silbey

Southern Sizing Co, East Point, Ga, has announced the appointment of *William A L Sibley Jr*, to its technical sales staff. Mr Sibley was formerly with the West Point Mfg Co, Lanett, Ala.

•

Two promotions in the sales organization of Solvay Process Division, Allied Chemical Corporation, became effective October 1.

Jerome L Hochenedel has been appointed assistant manager of Solvay's Houston, Texas sales branch. *E Kenneth Leins* has moved from the Division's Technical Service Department at Syracuse, NY to its New Orleans, La sales branch. He has been assigned to the Baton Rouge sales territory.

Mr Hochenedel joined Solvay in 1951 and since that time has been a salesman reporting to the New Orleans branch office and covering the Baton Rouge territory.

A Solvay employee for the past ten years, Mr Leins has had plant experience as well as field and laboratory background as a member of the Company's technical service staff.

•

Daniel H Cash Jr, a senior in the School of Textiles at North Carolina State College, is the 1959-60 recipient of the $500 Chemstrand Corporation Scholarship at the college.

Wells

Interchemical Corporation's Color & Chemicals Div has named *Henry A Wells* assistant sales manager of the Southern District. Mr. Wells, who has been a technical representative in the Southern District for the last six years, will continue to make his headquarters in Rock Hill, SC.

Also announced is the appointment of *Robert E Hardy* as technical service representative for dyestuffs in the Southern District, reporting to *Clovis S Powell*, Southern technical manager. Mr Hardy joined Interchemical in 1957 and has trained in the Hawthorne, NJ, and Rock Hill, SC, laboratories of the Color & Chemicals Division.

•

P J CLARKE

PETER J CLARKE, purchasing director and assistant secretary of Rohm & Haas Co, Philadelphia, was killed in an automobile accident near the city, Wednesday night, September 16. He had served as head of the Purchasing Department since 1939 and had held the post of assistant secretary since 1943. He was 56.

Wood

Harold C Wood has joined Dexter Chemical Corp, New York, NY, as a salesman in New England.

Mr Wood was formerly with Onyx Oil & Chemical Co in New England and eastern New York.

•

M E Lewis, general manager of the Armour Industrial Chemical Co, has been named a vice president of Armour and Company by the board of directors.

The Armour Industrial Chemical Co was formed last June with the merger of the Chemical and Ammonia divisions and the company's headquarters were moved to 110 N Wacker Drive, Chicago.

The board of directors also elected *J M Hoerner* and *C B Johnson* vice presidents. Mr Hoerner is general manager of the Grocery Products Division, and Mr Johnson is in charge of Armour Alliance Industries, Alliance, Ohio.

•

Ashley W Burner has joined American Cyanamid Company's Fibers Division as manager of product publicity and promotion.

Mr Burner will work closely with *Alden R Loosli*, division manager, and *Charles W Rice*, advertising manager, in the development of a coordinated product news, information and customer relations program for Creslan, Cyanamid's acrylic fiber.

Burner was formerly with Anderson and Cairns, Inc.

EMKAY CHEMICALS FOR YOUR TEXTILE PROCESSING

EMKAY MANUFACTURES:

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Abstracts

(concluded from page 60)

ed with a softener in a dye-beck, or a softener may be added to the binder.

Nonwoven fabrics are being used as backings for vinyl sheets by car manufacturers. Methods for combining the fabric to the vinyl sheet are described.

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New Man-made Fibers to Boom

Anon, *Chem Eng News 37, 86-96, Mar 30, 1959*

Today, synthetic fibers and textiles generally are more and more in the news. Companies in the field right now are pacing industry's recovery from recession's lows. In Washington, foreign trade aspects of textiles, cotton price supports, and fiber labeling laws are getting much attention.

Each of the top four chemical companies has an important, direct stake in textile fibers. Du Pont, with over-all 1958 sales of $1.8 billion, calculates that some $600 million of output went to textile trade outlets. The company makes synthetic fibers of several types, and supplies dyes, resins, and other products used in the trade. Union Carbide, next in total sales with $1.3 billion, is a growing producer of acrylic fiber (Du Pont is largest; Chemstrand, a joint Monsanto-American Viscose unit, is second). Dow, which moved into third place among chemical makers in 1958 with sales around $641 million, sells fibers, polymers, and resins to the trade. Allied Chemical, next with $636 million total 1958 sales, ships caprolactam to all nylon 6 makers, itself produces nylon 6, is a major factor in dyes, and sells resins to the trade.

The noncellulosic group, primarily polyamides (nylon), acrylics (such as Orlon, Acrilan) and polyesters (eg, Dacron), is today's fastest grower —now timetabled to hit the billion-pound annual production rate not later than 1963. Like any rapidly moving chemical, it has some over-capacity headaches.

There is hot competition between nylon and rayon for the tire cord business. According to the writer's figures, high-tenacity rayon filament is well in the lead today, with an annual capacity of 300 million lbs. Nylon, however, is growing steadily, and it is expected that it will not be long before nylon splits the market with rayon. Allied's nylon has also made some inroads into the tire cord market.

Acrylic fibers, now being made by six firms, are in over-production at present, but an increased demand is anticipated. Polyester fiber production is growing slowly, and it is expected that capacity will be in balance with demand by 1963.

Discussing cellulosic fibers, the author states that acetate has gained a firmer foothold recently. It is interesting to note than nearly all cigarette filter tips use acetate tow, which accounted for over 60 million lbs of acetate in 1958.

Cotton still accounted for two-thirds of all U S mill consumption of fibers last year. The author discusses the problems of over-production and foreign competition.

A brief history of the man-made fiber industry brings the article to a close, starting with Robert Hooke's 17th century proposal for making filaments from an "artificial composition."

•

New Sizing Materials for Synthetic Fiber Yarns

Anon, *Man-made Textiles 35, 52, 54, May, 1959; 36, 46, 48, June, 1959*

Sizing of synthetic fiber yarns is necessary to hold the filaments or fibers together and protect them from abrasion while the warp is in the loom, or when the yarn is in contact with the needles on the knitting machine. The strong fibers would otherwise readily pluck without breaking and cause slubs.

The sizing of hosiery yarns is carried out for two reasons: to protect the yarn as it passes through the needles into the fabric, and to protect the fabric itself. If a water-sensitive size is used, the yarn is moistened following established silk practice, and allowed to dry, as it leaves the needles, by controlling the humidity of the knitting room. The loops stick together, and the fabric is thus protected, by the continuous film of size, against snagging during the subsequent linking, seaming and preboarding operations.

It is apparent that two types of size are necessary, and even a third if dry knitting sizes are required for hosiery.

Sizes which are eminently suitable for viscose and acetate warps (such as the gelatin/wax, gelatin/glycerin combinations and those based on starch, and the methyl and ethyl celluloses and carboxymethyl cellulose) nearly all fail when applied to nylon and Terylene because of their lack of adhesion. Most of the size sheds itself in the loom or fails to fulfil the requirements for hosiery.

Linseed oil is still used (eg, for warp-sizing nylon). It has the desired property of sticking to the fiber, but is difficult to remove because of oxidation.

Gelatin sizes can be used on nylon if their wetting and adhesive powers are improved (eg, by addition of triethanolamine).

Warp sizing using casein-emulsified oils in alkaline dispersion, or dispersions of paraffin wax in alkaline casein, have met with much success in England for nylon and Terylene (but not in the U S, according to the author). The casein sizes do not adapt themselves to hosiery.

Hosiery yarn sizing for wet knitting nylon follows a process initiated by Du Pont. This is based on the use of polyvinyl alcohol solutions in water, which are controlled in viscosity and water sensitivity by the addition of boric acid. Several variations of this application are described. Sizes based on polyacrylic acid have found an extensive use in warp sizing. Owing to the corrosive nature of this material, the equipment must be made of resistant metal (eg, stainless steel). Several sizes of this type are described.

The copolymers of acrylic and methacrylic acids with styrene and maleic anhydride also have been suggested. A composition of this nature, recommended "for sizing and dressing spun and continuous filament yarns, and for winding, doubling, knitting, braiding and weaving," which is suitable for hydrophobic fibers has been patented by Rohm & Haas. While this application is particularly intended for nylon, it may also be adapted for use on polyester fibers and Acrilan. Details of the application of these newer sizes are given.

Other sizing materials discussed by the author are vinyl acetate, styrene, maleic acid, and butadiene-methacrylic acid; the last-named is claimed to be particularly good for polyester fibers. Several Monsanto recommendations, using these products, are described.

Finally, the aromatic carboxylic acids of Dow Chemical Co are briefly referred to. These are said to be particularly suitable for the sizing of nylon.

General Calendar

AMERICAN ASSOCIATION FOR TEXTILE TECHNOLOGY, INC
Oct 14, Nov 4, Dec 2, Jan 6, Feb 3, Mar 2, Apr 6, May 4, June 1 (Della Robbia Room, Hotel Vanderbilt, New York, NY)

SYNTHETIC ORGANIC CHEMICAL MANUFACTURERS ASSOCIATION OF THE UNITED STATES
Oct 13, Nov 4 (Luncheon meetings at the Hotel Roosevelt, New York, NY); Dec 2 (Annual meeting and dinner—Hotel Roosevelt, New York, NY)

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CLASSIFIED ADVERTISEMENTS

Advertisements in this section are restricted to HELP WANTED — POSITION WANTED — EQUIPMENT wanted or for sale. Rates, effective February 1, 1951; One-time, $14.00 per column inch; 13 or more times, $12.00 per column inch: Position Wanted, $4.00 per column inch. Figure 38 average words per column inch. Publisher reserves the right to reject or discontinue any classified advertisement. Replies should be addressed: Box Number ..... c/o American Dyestuff Reporter, 44 East 23rd Street, New York 10, N. Y.

• *SERVICES* •

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• *OPPORTUNITIES AVAILABLE* •

WANTED: CHEMIST — RESEARCH AND DEVELOPMENT — Require PhD or equivalent to take charge of R & D program in textile and paper chemicals and resins for well-established Southern firm. Please send resume and salary requirements to; Dr. Paul Seydel, Seydel-Woolley & Company, P. O. Box 2345, Atlanta, Georgia.

WANTED: MANUFACTURER'S REPRESENTATIVE—To sell finishing and cloth handling equipment in N.Y., N.J., Pa., Md., and Del., on commission. Would mesh well with a line of dyestuffs and textile chemicals. Should be familiar with equipment and process. Write Box No. 810.

HELP WANTED: TEXTILE CHEMIST — TECHNICIAN, for standardizing department of expanding dyestuffs company. Location—Pennsylvania. State experience, salary, etc. Write Box No. 816.

WANTED: WET FINISHING SUPERINTENDENT. Must have some chemistry background for processing knit goods in high quality sweater plant. Preferably experienced on woolens and blends. Excellent working conditions. THE LION KNITTING MILLS COMPANY, 3256 West 25th Street, Cleveland, Ohio.

WANTED: Wonderful opportunity for experienced Dyer on tricot fabrics. Southern location, good climate. Latest Burlington Beam equipment. Write Box No. 821.

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WANTED: TEXTILE FINISHER for knitted fabrics. Fully experienced with napping, framing, shearing and brush operations. Excellent opportunity with progressive New England firm. Age 30 to 45 preferred. Write full details to Box No. 822.

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